Before the
Federal Communications Commission
Washington, D.C.20554

In the Matter of	)	
	)	
Connect America Fund	)	WC Docket No. 10-90
	)	
A National Broadband Plan for Our Future	)	GN Docket No. 09-51
	)	
Establishing Just and Reasonable Rates for Local Exchange Carriers	)	WC Docket No. 07-135
	)	
High-Cost Universal Service Support	)	WC Docket No. 05-337
	)	
Developing an Unified Intercarrier Compensation Regime	)	CC Docket No. 01-92
	)	
Federal-State Joint Board on Universal Service	)	CC Docket No. 96-45
	)	
Lifeline and Link-Up	)	WC Docket No. 03-109
	)	
Universal Service Reform – Mobility Fund	)	WT Docket No. 10-208

COMMENTS OF THE NEBRASKA RURAL INDEPENDENT COMPANIES IN RESPONSE TO SECTIONS A THROUGH K OF THE FURTHER NOTICE OF PROPOSED RULEMAKING

Dated: January 18, 2012

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SUMMARY OF COMMENTS

The Nebraska Rural Independent Companies ("NRIC") hereby file these Comments in response to Sections A through K of the "Further Notice of Proposed Rulemaking" section ("*FNRPM*") of the Report and Order and Further Notice of Proposed Rulemaking, WC Docket No. 10-90., *et al*., FCC 11-161 (the "*Report and Order*"), released November 18, 2011. In Part I of these Comments, NRIC demonstrates that the Federal Communications Commission ("Commission") should abandon its proposed regression methodology as described in Appendix H attached to the *Report and Order*. While NRIC still supports the general concept of using regression analysis to determine reasonable going-forward constraints for federal Universal Service Fund ("USF") recovery, such reasonable constraints must meet the sufficiency and predictability standards of 47 U.S.C. § 254 and the regression methodology itself must be transparent. Moreover, based on real-world operating experience, NRIC has concluded that the lack of predictability will thwart investment, a result directly at odds with the goal of the encouraging the provision of facilities-based broadband services.

The Commission's proposed regression model is overly complex and punitive in setting 11 individual caps, any one of which, if triggered, could result in reductions in USF support even though overall "headroom" exists for a rate-of-return ("ROR") Eligible Telecommunications Carrier ("ETC") with regard to the other 10 caps, and that ROR ETC may have lower overall cost than similarly situated ROR ETCs. While this complexity can be mitigated by looking at total company costs with one cap for expenses and another for investments, that correction will not resolve the other significant problems with the Commission's proposed regression analysis.

While NRIC's Comments provide specific details, in general, significant data and methodological problems exist in the non-transparent proposed regression analysis outlined by

the Commission in Appendix H. NRIC demonstrates that the Commission's proposed regression analysis is inconsistent with common sense notions of sufficiency by: (1) omitting or giving inadequate weight to several key geographic factors that affect costs; (2) including insignificant independent variables in the regression equations; (3) not addressing the problems of multi-collinearity and heteroscedasticity that are present in the model; (4) using inaccurate exchange maps; (5) using logarithms to transform variables which lead to incorrect and arbitrary results; (6) failing to be present robust results with low pseudo-R-squared values; (7) focusing on total cost, not on unit cost, thereby failing to control for study area size and allowing company size (*i.e.*, loop count) to become the most important independent variable; (8) setting the caps at an unacceptable 90th percentile level in light of the poor regression fit demonstrated in the *FNPRM*; (9) recalculating the caps annually, resulting in risk of a feedback loop in which the caps create a "destructive spiral" of ever-declining cost levels; and (10) redistributing USF as described in paragraph 220 of the *Report and Order* by apparently drawing a distinction between carriers who are not subject to any of the new caps and those who are subject to at least one cap.

Likewise, NRIC demonstrates that the Commission's proposed caps on investment and expenses will make USF recovery unpredictable based upon the: (1) reliance on inaccurate exchange maps; (2) employing an infrequently used and complex method of regression, Quantile Regression ("QR"), rather than Ordinary Least Squares ("OLS") Regression; (3) dependence on Census data, which is beyond carriers' control, and which, if the number of households within an area changes in the future, may result in triggering caps for investments already made based on the obligation to serve the previous households located within the carrier's service area; (4) dependence on other carriers' spending levels, making future caps difficult to predict; (5) use of a large number of caps, combined with their complexity, making it difficult for carriers to

determine the level of investment or expense that will exceed the caps; (6) annual recalculation of the caps and the resulting risk that current reasonable investment will be considered excessive in the future; (7) focus on regulating production technology rather than total cost, without regarding to overall efficiency; and (8) over-reliance on one variable, company size as measured by number of loops, rather than density, the primary cost driver.

Moreover, NRIC concludes that the methods described in the *FNPRM* to establish the 11 investment and expense caps create a significant incentive for carriers to manage their company's results to fit the system rather than to look for efficiencies. This incentive results in: (1) carriers spending time and money managing the cost accounting system to ensure that any individual cap is not exceeded, rather than finding ways to keep overall costs at a reasonable and efficient level based on the unique characteristics of the area and customers served; (2) inadvertent influencing of technology choices in order to meet one of the caps, while creating a solution that is less efficient overall; and (3) creating incentives for shifting costs from one category to another rather than providing incentives for overall efficiency since carriers that become subject to one cap, even by a miniscule margin, will not be eligible for any redistribution dollars.

In summary, the overly complex caps and the use of QR rather than OLS in the Commission's proposed regression analysis simply cannot meet the statutory tests of sufficiency and predictability, let alone transparency. ROR ETCs should not be required to expend resources relying on economists and statisticians to determine the investment and expense levels that may or may not be permitted in future periods. Nevertheless, this result will follow from the Commission's proposed regression model, coupled with disincentives to make broadband deployment decisions. NRIC believes that basing caps on an analysis of total investment and

expenses of an ROR ETC may very well address certain of the complexity issues noted as well as lead to more sufficient and predictable USF recovery levels (and be more transparent in doing so.) However, the Commission would still need to merge its currently disparate methods of capping Corporate Operations Expense with that of the regression-based High Cost Local Support caps. The Commission must also ensure that any redistribution of federal USF caused by implementation of the regression caps will be made to ROR ETCs, even those ETCs that have triggered one or more of the caps.

In Part II of these Comments, NRIC provides five critical guiding principles with respect to "remote areas" in order to ensure that policies regarding ROR ETC "remote areas" properly reflect ROR ETCs' past commitments to and deployment of broadband. These principles include: (1) the use of more accurate mapping in light of the observations made on the same topic in Part I of these Comments and to do so in coordination with state commissions which can bring to bear their own experience with Carrier of Last Resort issues and state universal service funds; (2) the assurance that any remote area policy recognizes that voice remains the only element of universal service reflected in the Commission's rules and that such policy assures the ability of the ROR ETC voice provider to upgrade its network through the use of additional USF over a reasonable amount of time; (3) compliance with 47 U.S.C. § 214(e); (4) application of readily identifiable public interest obligations as noted herein; and (5) the need for consumer subsidies to be made part of modifications to the current Lifeline programs and be used to supplant dollars available for the deployment of broadband networks.

In addition, NRIC demonstrates the need for the Commission to include the middle mile transport costs of an ROR ETC in its Connect America Fund ("CAF") disbursement levels, once those costs are properly defined. This requirement is necessary to avoid a mismatch between the

obligations to provide certain broadband speeds, with the cost recovery for the network necessary to provide that speed. To do otherwise ignores the fact that middle mile transport is an integral component of the costs incurred to reach the public Internet. While the Commission's consideration of the special access costs of certain third party providers should continue, middle mile cost recovery needs to remain dynamic because of the significant cost that middle mile represent and the fact that such cost will increase as demand for broadband and higher speeds also increase. Because middle mile costs have not previously been supported, the dollars in the CAF will need to be increased to accommodate ROR ETCs' middle mile transport cost recovery, albeit coupled with reasonable reporting requirements to ensure accountability (*i.e.*, the identification of middle mile transport facilities providers, subject to confidentiality requirements), the description of bandwidth provided by middle mile transport providers, the price per unit (distance, bandwidth etc.) by middle mile transport providers; and the number of broadband customers by speed category (categories of broadband consumers based on middle mile/backbone capacity of use).

Finally, in Part II of these Comments, NRIC demonstrates that broadband-only loops should, as a matter of rational public policy, be included in any universal service funding requirement for an ROR ETC. This result reflects consumers' choice with respect to the services requested from ROR ETCs. Moreover, in light of the considerable "belt tightening" that the Commission has imposed on ROR ETCs, NRIC demonstrates that any savings in budgeted CAF should be re-allocated to the universal service mechanisms for ROR ETCs. This result will encourage the proper funding for ROR ETCs, advancing Section 254's sufficiency requirements and result in the deployment of broadband networks in the rural areas that ROR ETCs serve.

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COMMENTS OF THE NEBRASKA RURAL INDEPENDENT COMPANIES IN RESPONSE TO SECTIONS A THROUGH K OF THE FURTHER NOTICE OF PROPOSED RULEMAKING

The Nebraska Rural Independent Companies ("NRIC"),[1] which provide telecommunications and broadband access services to some of the most-rural, sparsely populated parts of America, appreciate the opportunity to submit these Comments in response to the

[1] The Companies submitting these Comments are: Arlington Telephone Company, The Blair Telephone Company, Cambridge Telephone Company, Clarks Telecommunications Co., Consolidated Telephone Company, Consolidated Telco, Inc., Consolidated Telecom, Inc., The Curtis Telephone Company, Eastern Nebraska Telephone Company, Great Plains Communications, Inc., Hamilton Telephone Company, Hartington Telecommunications Co., Inc., Hershey Cooperative Telephone Co., K. & M. Telephone Company, Inc., The Nebraska Central Telephone Company, Northeast Nebraska Telephone Company, Rock County Telephone Company, Stanton Telecom Inc., and Three River Telco.

Further Notice of Proposed Rulemaking issued by the Federal Communications Commission (the "Commission").[2]

PART I – REGRESSION ANALYSIS

I. INTRODUCTION

According to the *Report and Order*, the proposed reforms to existing federal Universal Service Fund ("USF" or the "Fund") and the Connect America Fund ("CAF") mechanisms for rate-of-return ("ROR") carriers that have been designated as Eligible Telecommunications Carriers ("ETCs")

> will help further the statutory goals of ensuring (1) quality services at 'just, reasonable, and affordable rates,' and (2) 'equitable and non-discriminatory' contributions such that support is 'sufficient' to meet the purposes of Section 254 of the Act, [footnote omitted] and will advance the Commission's goals of ensuring fiscal responsibility in all USF expenditures, increasing the accountability for Fund recipients, and extending modern broadband-capable networks.[3]

Later in the *Report and Order*, the Commission more expansively states that the reforms will keep the Fund within a $2 billion ROR carrier budget "while transitioning from a system that supports only telephone service to a system that will enable the deployment of modern high-speed networks capable of delivering 21st century broadband services and applications, including voice."[4] With these objectives and goals in mind and subject to the framework that the

[2] *See*, Report and Order and Further Notice of Proposed Rulemaking, Public Notice, WC Docket Nos. 10-90, 07-135, 05-337, 03-109, CC Docket Nos. 01-92, 96-45, GN Docket No. 09-51, WT Docket No. 10-208, released November 18, 2011. In these Comments, references to paragraphs 1 through 1011 will be noted as sourced from the "*Report and Order"* and references to paragraphs 1012 through 1403 will be noted as sourced from the "*FNPRM*".

[3] *Id.* at para. 194.

[4] *Id.* at para. 195.

Commission established in the *Report and Order*, NRIC here provides its perspectives as to the reasons why the Commission's proposed regression methodology will not achieve the statutory requirements of USF support that is "predictable and sufficient,"[5] will not be transparent and will undermine the Commission's goal of deployment of ubiquitous broadband availability, particularly in rural areas of this country.[6]

II. NRIC CONTINUES TO ENDORSE THE CONCEPT OF USING REGRESSION-BASED CAPS AS PART OF AN OVERALL SYSTEM BUT ONLY WHERE THE APPLICATION OF THE REGRESSION FORMULA MEETS THE STATUTORY STANDARD OF SUFFICIENT AND PREDICTABLE SUPPORT AND THE COMMISSION'S STATED GOAL OF ENCOURAGING TRANSPARENCY.

The *Report and Order*, the *FNPRM*, and Appendix H collectively set forth a proposed methodology to establish capital expense and operating expense limits for high cost loop support ("HCLS") received by ROR ETCs.[7] The proposal fundamentally alters work previously submitted by NRIC. The Commission seeks comment generally on this proposal, which it seeks

[5] 47 U.S.C. § 254(b)(5), (d) and (e).

[6] NRIC notes that reconsideration requests have been filed regarding certain aspects of the *Report and Order* and petitions for review of the Commission's action have not been consolidated in the United States Court of Appeals for the Tenth Circuit (the "10th Circuit"). Nothing in these comments can be or should be used as a means of thwarting consideration of the substantive positions raised in the reconsideration requests and the petitions for review now before the 10th Circuit.

[7] *FNPRM*, at paras. 224 and 1083. The following 11 categories would be capped: AS1 (Cable & Wire Facilities ("C&WF") Investment Cat. 1), AS2 (Central Office Equipment ("COE" Investment Cat. 4.13), AS7 (Material & Supplies ("M&S" Cat. 1), AS8 (M&S Cat. 4.13), AS13 (C&WF Maintenance Expense Cat. 1), AS14 (COE Maintenance Expense Cat. 4.13), AS15 (Network Support Expenses plus General Support Expense assigned to C&WF Cat. 1 and COE Cat. 4.13), AS16 (Network Operations Expenses assigned to C&WF Cat. 1 and COE Cat. 4.13), AS17 (Depreciation and Amortization Expense assigned to C&WF Cat. 1), AS18 (Depreciation and Amortization Expense assigned to COE Cat. 4.13), and AS21 (Benefits other than Corporate Operations Expense assigned to C&WF Cat. 1 and COE Cat. 4.13).

to implement on July 1, 2012.[8] In this Section, as well as in Sections III through VI of these Comments, NRIC provides its observations, critique and suggestions with regard to the Commission's proposed regression methodology and its recommended capital and operating expense caps.

A. NRIC Supports Properly Performed and Applied Regression-Based Caps in Principle.

The companies comprising NRIC provide telecommunications and broadband access services to some of the most-rural, sparsely populated parts of America and have taken a leading role in the submission to the Commission of regression analyses of outside plant capital expenditures and of operating expenses for ROR ETCs.[9] In an effort to promote continuation of ROR regulation for small carriers, NRIC submitted its analyses in response to Commission staff's requests for such input from parties. To be sure, however, NRIC's efforts were not a sweeping endorsement for any regression models. Rather, only where the result of the regression analysis created results that were sufficient and predicable (which NRIC respectfully suggests that its efforts achieved or could achieve) would the use of regression analysis to limit expenditures be statutorily proper, subject to an efficient and reasonable waiver process available to a carrier that believes the regression results are inconsistent with the statutory mandate of sufficiency and predictability.

Consistent with NRIC's *Capex Study* and *Opex Study*,[10] NRIC continues to support the general concept of properly designed and reasonably applied regression-based caps for universal

[8] *Id.*, at paras. 216; and *FNPRM* at para. 1079.

[9] *See, Report and Order* at paras. 212 and 213.

[10] *In the Matter of a National Broadband Plan for Our Future*, GN Docket No. 09-51, Nebraska

service support. Such caps can ensure that the Fund is sustainable and efficiently distributed while at the same time meeting the Commission's established Fund budget for ROR ETCs. Performed properly, caps would reduce the current tendency of the HCLS mechanism to encourage a spending "race to the top" by carriers seeking to maximize their HCLS. At the same time, caps would reduce the tendency of the existing system to reduce support drastically over time to carriers that have already made substantial investments in broadband.

With this in mind, therefore, NRIC suggests that any properly formulated regression analysis should meet the following criteria.

1. Support Mechanisms That Include Caps Should Provide Sufficient Support.

Section 254 of the Act requires that federal support must be sufficient.[11] Therefore, any cost caps imposed on supported ETCs must be based on reasonable determinations of the actual needs of those operating carriers. It is therefore reasonable to base those caps on the actual levels of capital and operating expenses reported by comparable ROR ETCs. Any such regression-based caps should also ensure that Fund support is equitably distributed among all ROR ETCs at levels that meet the statutory sufficiency requirement. As will be discussed, it is highly doubtful that the Commission's regression model proposal meets this requirement.

Rural Independent Companies' Capital Expenditure Study: Predicting the Cost of Fiber to the Premise filed Jan. 7, 2011 at 14 ("*Capex Study"*). *In the Matter of a National Broadband Plan for Our Future*, GN Docket No. 09-51, Operating Expense Study Sponsored by the Nebraska Rural Independent Companies: Update to Predicting the Operating Expenses of Rate-of-Return Telecommunications Companies, filed Sep. 29, 2011 at para. 24 ("*Opex Study").*

[11] *See, e.g.*, 47 U.S.C. §§ 254(b)(5), (d), (e).

2. Support Mechanisms That Include Caps Should Promote Investment by Providing Predictable Support.

A well-designed support mechanism must be predictable so that ROR ETCs will have reasonably clear knowledge of the future course of their federal support and so that a ROR ETC, once it has been so informed, will have an incentive to invest in infrastructure sufficient to provide facilities-based, terrestrial fixed broadband to the rural areas which the ROR ETC serves.

The Commission claims it shares these goals. The *Report and Order* identified a goal of providing "more certainty and predictability regarding revenues to enable carriers to invest in modern, IP networks."[12] The goal of providing more predictable funding for carriers informed many of the Commission's proposals. These included the decisions to establish a budget for USF support[13] and to adopt a transitional recovery mechanism.[14] The proposed regression-based caps on the HCLS mechanism were also aimed at "inject[ing] greater *predictability* into the current HCLS mechanism, as ROR ETCs will have more certainty of support if they manage their costs to be in alignment with their similarly situated peers."[15] The Commission also has invited comment on "how best to ensure a *predictable path* forward for rate-of-return companies to extend broadband."[16]

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[12] *Report and Order* at para. 9.

[13] *Id.* at para. 18.

[14] *Id.* at para. 36.

[15] *Id.* at para. 221 (emphasis added).

[16] *Id.* at para. 117 (emphasis added).

NRIC also trusts that the Commission would agree that, as an overarching matter, the universal service support system, with or without caps, should contain positive incentives that encourage rural ROR ETCs to invest in the network. These incentives in the past, and the use of embedded costs for universal service, have constructively encouraged rural build-out of broadband. Nebraska's experience is consistent with this national trend. The companies that comprise NRIC, which generally receive federal and state USF payments based at least in part on embedded costs, have established advanced networks in Nebraska, and have achieved a higher level of digital subscriber line ("DSL") deployment in their rural service areas than have price cap companies in Nebraska or nationally.

However, to ensure these types of results and in order to make rational investment decisions relating to broadband deployment, NRIC respectfully submits that a ROR ETC must have the ability to reasonably determine the level of USF support that will be provided over a relatively long period. For a ROR ETC to make a major capital investment in broadband, the carrier will need a plausible business model showing that the new investment will generate a positive return. To reach that condition, the ROR ETC will need to know how much federal support the incremental investment and the associated operating expenses will generate, over a span of at least five years, and preferably ten years. In any event, replacing embedded costs entirely with a full-blown engineering cost model or an auction process should not be pursued.

3. Any Regression Analysis Must also Be Transparent.

To achieve predictability, a transparent mechanism also is essential. This principle applies not only to the support system, but also to any proposed cost caps. Providing a ROR ETC with a clear understanding of what costs are reasonable and what costs are excessive will help provide effective incentives for carriers to manage their businesses and to make the

investments in broadband that the Commission seeks. As NRIC will discuss, the proposed caps are deficient in achieving predictability and transparency, as well as sufficiency.

B. NRIC Has Produced Transparent Proposals for Regression-Based Caps in Past Filings That It Submits Meet the "Sufficient" and "Predictable" Requirements.

As the Commission has noted, NRIC's *Capex Study* "compared individual company non-public cost data to a variety of objective publicly available geographic and demographic variables and performed regression analyses using these public variables as independent variables and construction cost per household as the dependent variable."[17] The six independent variables that were found to be significant were linear density, households, frost index, wetlands percentage, soils texture, and road intersections frequency.

Similarly, NRIC performed a regression analysis regarding operating expenses of ROR ETCs operating in rural areas. The Commission further noted that "[i]n this regression the dependent variable was average annual operating expenses per connection (in thousands of dollars) and the four independent variables that were found to be significant were customer density, company location, company size, and number of employees."[18]

Against this straightforward analysis, however, the Commission proposed a far different form of regression analysis that not only is unduly complex but also contains significant methodological flaws. As a result, in its current form the Commission's proposed regression analysis cannot possibly meet the statutory requirements of sufficiency and predictability, let

[17] *Id.* at para. 212.

[18] *Id.* at para. 213.

alone the Commission's companion notion of transparency. Accordingly, the Commission's proposed regression analysis should be rejected for the reasons stated below.

III. THE PROPOSED REGRESSION ANALYSIS IS OVERLY COMPLEX AND THE CAPS PROPOSED IN THE *FNPRM* ARE NOT PREDICTABLE AND WILL NOT PROMOTE INVESTMENT, THEY FAIL TO PROVIDE SUFFICIENT SUPPORT, AND THEY SHOULD NOT BE ADOPTED AS PROPOSED.

The Commission seeks comment on a "specific proposed methodology for setting the benchmark levels to estimate appropriate levels of capital expenses and operating expenses for each incumbent rate-of-return study area, using publicly available data."[19] In this Section of these Comments, NRIC summarizes how the regression methodology is unnecessarily complex and how the caps proposed in the *FNPRM* would affect the universal service mechanism's ability to provide sufficient support and promote investment. Sections IV and V below discuss in more detail the elements of the regression studies and the resulting proposed caps. Section VI below discusses how the annual recalculation of the caps and associated redistribution of support will cause payments to be unpredictable and insufficient.

A. The Commission's Regression Model is Unnecessarily Complex.

The Commission's proposed methodology is described in the *FNPRM* and Appendix H. It requires 11 regression studies to establish 11 caps in 11 of the cost categories (or "Algorithm Steps") that NECA uses for the HCLS calculation. In each case, the cap would be set at the 90th percentile level using a "quantile" method of regression. Each of the regression studies uses the same 11 independent variables, nearly all of which are derived from the 2010 U.S. Census

[19] *Id.* at para. 210.

("Census"). Most, but not all, variables are transformed using logarithms. In 11 separate calculations, a ROR ETC's costs would be adjusted based on the ROR ETC's measured values for the independent variables used in the regression, such as loops and housing units. NRIC finds the Commission's proposed model to be overly complex, producing results that are not predictable or transparent, as will be discussed.

B. The Proposed Caps Will Make Support Insufficient.

NRIC respectfully submits that the methods described in the *FNPRM* to establish investment and expense caps will be highly likely to make support insufficient to at least some ROR ETCs. Based on analysis performed on behalf of NRIC,[20] the Commission's regression is flawed in critical ways:

- The *FNPRM* regression analysis has used invalid or weak independent variable data, omitting or giving inadequate weight to several key geographic factors that affect costs.
- The Commission's exchange maps, upon which aspects of the regression analysis is based, are inaccurate.
- The use of logarithms to transform independent and dependent variables was not adequately explained, and, in fact, was incorrect and arbitrary.
- The regression results are not robust, with low pseudo-R-squared values. If cost caps were built on those results, the caps would likely cause many carriers to receive insufficient support.

[20] NRIS utilized the services of various experts in analyzing the regression model, including Peter Bluhm of Rolka Loube Saltzer Associates, Edit Kranner of Consortia Consulting, Jeffrey Reynolds and Scott Schultheis of Reynolds Schultheis Consulting, Inc., David Healy of Stone Environmental, Inc. and knowledgable representatives of the companies comprising NRIC.

- The regression methodology inappropriately focused on total cost, not on unit cost, thereby failing to control for study area size and allowing company size (i.e. loop count) to become the most important independent variable.
- Setting the caps at the 90th percentile level is too harsh, given the poor regression fit demonstrated in the *FNPRM*.
- Annual recalculation of the caps creates a risk of a feedback loop in which the caps create a "destructive spiral" of ever-declining cost levels.
- The redistribution mechanism described in paragraph 220 of the *Report and Order* draws a distinction between carriers who are subject to the new caps and those who are not. A carrier that becomes subject to one cap in just one category, even by a miniscule margin, will suffer substantial financial loss—even if the carrier is under the other ten caps and overall its total loop cost is below that of similarly situated companies.

C. The Proposed Caps Make Support Unpredictable.

NRIC respectfully submits that the methods described in the *FNPRM* to establish investment and expense caps are uncertain and therefore will make support unpredictable. There are several reasons for the high level of uncertainty.

- The Commission's exchange maps are inaccurate.
- The use of Quantile Regression ("QR"), rather than Ordinary Least Squares ("OLS") Regression, makes support less predictable because QR is complex and not widely used.

- The caps depend on Census data, which is beyond carriers' control. Investment decisions are made based on the households that must be served at a specific point in time. If customers move out of a carrier's service area, a carrier may find that it exceeds an investment cap calculated based on new Census data, but has no way to change its previously made, rational investment decision.
- The caps depend on other carriers' spending levels, making future caps difficult to predict.
- The large number of caps, combined with their complexity, makes it difficult for carriers to determine what level of investment or expense will exceed the caps.
- Annual recalculation of the caps creates risks that today's reasonable investment will be considered excessive in the future solely because other carriers change their spending behavior.
- Establishing 11 separate caps improperly focuses federal policy on regulating production technology rather than total cost, and in applying those caps fails to recognize overall company efficiency.
- The manner in which ROR ETCs are grouped together appears overly reliant on one variable, company size as measured by number of loops, which alone is not necessarily a significant predictor of costs, as NRIC previously found.

As a result, the proposed regression-based caps would inhibit investment by ROR ETCs in broadband. This result would frustrate the Commission's policy objective of promoting deployment of modern high-speed networks capable of delivering 21st century broadband services and applications, including voice.

D. The Proposed Caps Encourage Gaming and Will Not Encourage Efficiency.

NRIC respectfully submits that the methods described in the *FNPRM* to establish investment and expense caps will be highly likely to encourage carriers to game the system rather than to look for efficiencies. The features that encourage gaming include the following:

- Establishing 11 separate expenditure caps causes carriers to spend time and money managing the cost accounting system to ensure that any individual cap is not exceeded, rather than finding ways to keep overall costs at a reasonable and efficient level based on the unique characteristics of the area and customers served.
- Establishing 11 separate expenditure caps can inadvertently influence technology choices in order to meet one of the caps, while creating a solution that is less efficient overall.
- The structure of the mechanism creates incentives for shifting costs from one category to another rather than providing incentives for overall efficiency since carriers that become subject to one cap, even by a miniscule margin, will not be eligible for any redistribution dollars.

IV. THE REGRESSION STUDIES UNDERLYING THE PROPOSED CAPPING MECHANISM HAVE NUMEROUS FLAWS THAT ARE LIKELY TO PRODUCE INSUFFICIENT AND UNPREDICTABLE SUPPORT.

NRIC finds that the regression techniques used by the Commission in the *Report and Order* and the *FNPRM* can and should be substantially improved before adoption. Even though preliminary results appear to indicate that the companies that comprise NRIC would benefit by the redistribution of money under the regression caps, NRIC does not support the caps as

currently constructed because they produce support that is neither predictable nor sufficient. The regression analysis performed by the Commission has three overarching flaws related to: (1) the input data; (2) the problems with the regression methodology; and (3) the design of the proposed caps. These problems will discourage carriers from investing in the expanded broadband facilities that the Commission seeks.

A. Density is a Critical Variable, if Not the Most Important Determinant of Cost, and is Not Adequately Considered in the *FNPRM*.

As previously demonstrated by NRIC, density is a critical variable related to costs that has not been given adequate treatment in the *FNPRM*. While the Commission's proposed regression does indeed address density in the form of one or more proxies for density,[21] NRIC respectfully submits that the treatment was inadequate.

The *FNPRM* claims that the number of census blocks in a study area is a proxy for density.[22] The Commission provides no empirical analysis to support this claim. There may indeed be a small correlation between census blocks and density, but a small correlation between two variables does not make one a "proxy" for the other. The Commission has made no demonstration that the relationship approaches a one-to-one correspondence that would make census blocks a legitimate "proxy" for density.

There are other reasons why a study area might have many census blocks. One obvious choice is simply that the study area contains a relatively large population. If one seeks a proxy for density, the number of census blocks per square mile might be a candidate, but certainly not the raw number of census blocks in a study area. Asserting this proxy simply ignores the fact

[21] *FNPRM*, Appendix H, at para.19.

[22] *Id.* at para. 24.

that geographically larger study areas and more densely populated areas generally include more census blocks.

The Commission constructed a "weighted density" independent variable.[23] Because of methodology flaws, however, that variable turned out to have low significance in most of the regression studies, and, the Commission ultimately rejected this variable.[24] Thus, the Commission has not used any explicit density variable, or even a plausible proxy, in its regression model.[25] Yet the record in this proceeding provides persuasive evidence that density is, in fact, an important cost driver, if not the most important one. In NRIC's *Capex Study*, NRIC reported in this study that density is a strong predictor of cost and that the relationship closely fits a hyperbola of the form:

$$(Cost / Locations) = a + (b/\text{Density})$$[26]

NRIC reported in this study an R-squared of 0.71 using area density alone, without considering any other independent variables.[27] This R-squared statistic is significantly higher than any pseudo-R-squared reported for the Commission's regression analyses.

In the same study, NRIC also reported that *linear density* (locations per route mile) was more significant than *area density* (locations per square mile), achieving an R-squared of 0.87 without using any other independent variables.[28] NRIC also found that operating expenses per

[23] *Id.* at paras. 24-26.

[24] *Id.* at para. 29.

[25] An implied density variable could arise from the combination of using area and loops (and housing units) as inputs and using log-log regression.

[26] *Capex Study* at 14.

[27] *Id.*

[28] *Id.* at 15.

connection was significantly related to the area density of the carrier's service area per access line.[29] Linear density was not available for the data used in NRIC's *Opex Study*, so NRIC cannot assess whether linear density would have been a better variable for estimating operating expenses. Nonetheless, this NRIC finding about the superiority of linear density is consistent with the acknowledgement within the *FNPRM* that "large swaths of land in a study area may have absolutely no homes or businesses."[30]

While linear density may marginally be a better independent variable than area density, the difficulty in collecting and verifying linear density data makes this variable impractical. When NRIC initially found linear density to be a better variable than area density, the cable miles used in the calculation of linear density were obtained from engineering construction plans. Since cable is generally plowed along roads, NRIC substituted publicly available road mile data from the Census for the proprietary engineering data. In doing so, NRIC found that data had to be excluded because the public data differed from the engineering data in material ways for many study areas. Despite its best efforts to reconcile GIS-produced road miles and cable route miles, NRIC was unable to reliably do so because different states have different ways of classifying roads,[31] and areas with extremely low density created either situations in which GIS-produced road miles greatly exceeded actual cable route miles[32] or situations where the opposite

[29] In NRIC's *Opex Study*, NRIC found that area density (access lines per square mile) was a significant variable in predicting operating expense. Moreover, net wireline plant per connection was also significant, a variable which in turn is probably related to density. *Opex Study* at 3.

[30] *FNPRM*, Appendix H at para. 25.

[31] In NRIC's *CapEx Study*, NRIC excluded major divided highways (FCC Class 1), roads with special characteristics such as cul-de-sacs, access ramps, and traffic circles (FCC Class 6) and thoroughfares including walkways and driveways (FCC Class 7).

[32] In some situations, GIS road miles included roads that connect to irrigation pumps, etc., but do not pass any subscriber locations.

occurred.[33] Area density, which can reliably be obtained from public sources assuming study area boundaries are accurate, provides a reasonable and reliable result without the problems associated with linear density.

The Commission has failed to find a reliable model, and has left several of its actions or omissions largely or totally unexplained, including the following:

- Why did the Commission not report evaluating the *inverse* of density as an independent variable, despite information in the record that this would improve the reliability of the regressions?
- Why did the Commission not keep density as a variable in studies when it accepted other variables that were less significant?
- How could density, the number one variable found in NRIC's *Capex Study* and also significant in NRIC's *Opex Study*, turn out to be insignificant in the Commission's studies?

NRIC has two possible answers to the last question. First, NRIC respectfully submits that the rejection of weighted density as a variable was invalid because it was arrived at by inappropriate statistical methods. Second, the Commission added density as a variable incrementally, and only after 11 other variables (many of which were collinear) had already been included in the regression equation. Many of those independent variables already in the mix were less significant than density or were not significant at all. Either of these answers,

[33] In an effort to reconcile GIS road miles with cable miles, NRIC eliminated road segments that crossed unpopulated census blocks. However, doing so causes problems in extremely remote areas, such as Montana, where, in fact, roads cross such census blocks in order to reach customer locations.

however, represents serious error in regression procedure that the Commission has not explained.[34]

B. The Commission's Suggested Input Data Are Too Narrow and Inaccurate to Reliably Predict Costs.

If support is to be sufficient, any caps established under the construct proposed in the *FNPRM* must be based on reliable regression studies, but no regression study can become reliable without valid input data. The Commission has not yet acquired valid input data that will allow its regression results to be reliable at predicting costs. Therefore, the Commission must seek new data from ROR ETCs or other sources before implementing any caps that will be valid and withstand legal challenges.

1. The Commission's Decision to Use Only Readily Available Data Caused its Regression Results to Be Unreliable.

The Commission based its analysis on data "readily available to the Commission and the public."[35] In the *FNPRM*, the Commission concluded that this approach could be readily implemented and more easily updated than the NRIC proposal, which would require collection of additional data and implementation delays.[36] "Readily available" data cannot always generate reliable regression results. As discussed below,[37] the final regression results reported in

[34] The second reason is explained below in Section I.A.6 (by focusing on total cost rather than unit cost, the regressions obscured all factors except size, based on the number of lines).

[35] *FNPRM* Appendix H. at para. 1; *see also*, para. 1083 ("currently available" data).

[36] *Report and Order* at para. 224.

[37] *See* Section IV.C.5.

Appendix H of the *FNPRM* are not robust. This weakness originates in large part from the lack of valid independent variable data.

NRIC agrees that the Commission cannot directly use proprietary cost data to build cost caps. NRIC also understands that the Commission is not accustomed to collecting cost data from individual construction projects and that it would be difficult to convert anecdotal construction project data into a sufficiently representative and standardized data set.[38] Nevertheless, this difficulty should not preclude, or be used to preclude, efforts to gather reliable data. As such, per-location capital expenditure data from specific projects can usefully inform the Commission about the reasonableness of per-location or per-line cost caps.

Since the cost caps ultimately would limit recognition of embedded Uniform System of Account ("USOA") data, it is reasonable initially to limit the regression analysis to investment and expense cost data recorded by carriers under USOA and reported to National Exchange Carrier Association, Inc. ("NECA"). Nevertheless, the Wireline Competition Bureau (the "Bureau") should continue to work on improving the diversity of its data sources. NRIC again urges the Commission and the Bureau to broaden the scope and validity of input data by acquiring and utilizing valid data to support any cost caps.

The main weakness of the *FNPRM*'s regression analysis comes not from its failure to collect cost data, but from the absence of valid data to determine proper independent variables. As the *Report and Order* notes, NRIC previously offered a study of broadband investment that relied on several geographic variables.[39] The Commission criticized NRIC's filings because the

[38] *Report and Order* at para. 224.

[39] *Id.* at para. 224.

underlying data did not cover all study areas.[40] NRIC respectfully submits that the Commission has overstated this problem.

A cost study can be representative and standardized without covering the universe of ROR ETCs in the United States. A representative sample of study areas can produce a reliable regression and can support a rational cost-based cap. In fact, in the past the Commission has relied on regression studies of sampled Rural Utilities Service construction data in order to construct cost models.[41] Thus, a regression study based on comprehensive data from a sample of carriers can be more reliable than a cap based on weak or irrelevant data that happen to be conveniently available.[42]

In addition, NRIC also notes that the Commission's own work excluded numerous data points for various reasons. Some data were excluded because the carriers affected are regulated under the Commission's interstate price cap regime.[43] Other data were excluded because Census Bureau information was not available.[44] In neither of these cases, however, did the Commission determine that a possible independent variable should be excluded because it was not fully populated for every study area.

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[40] *FNPRM* at para. 1983.

[41] *Federal State Joint Board on Universal Service*, Tenth Report and Order, FCC 99-304 (Oct. 1999), paras. 113-16.

[42] If a geographic data set is not complete in all parts of the country, when it comes time to apply a cap, a default value can be applied in areas where input data are missing.

[43] *FNPRM* at para. 1081.

[44] Twenty-eight study areas were excluded because there was no census block information available. *Id.*, Appendix H at para. 21.

2. The FNPRM Regression Studies Contain Almost No Geographic Data, which NRIC Found to Be Significantly Related to Cost.

The *FNPRM* conveys the general impression that the Commission used a variety of geographic data for independent variables in its regression studies. In reality, the *FNPRM* regressions contain almost no useful geographic data.

In the *FNPRM* regressions, the Commission used 2010 block-level Census data that it mapped to each study area.[45] The independent variables included: number of loops; number of housing units (broken out by whether the housing units are in urbanized areas, urbanized clusters, and nonurban areas); and several geographic measures such as non-urban land area, water area, and the number of census blocks (each broken out by urbanized areas, urbanized clusters, and nonurban areas). Many of these data elements are not independent but are collinear variants of size. For example, housing units are closely related to loops. As the *Report and Order* notes, however, NRIC's final regression equation for capital expense included six independent publicly available variables: linear density, households, frost index, wetlands percentage, soils texture, and road intersections frequency.[46] The Commission's independent variable data source is far less comprehensive.

As a result, NRIC concludes that the Commission can and must make substantial improvements in its regression models to include more than "readily available" Census data. For reasons discussed in the following sections, the *FNPRM* regression analysis used invalid or weak independent variable data, which weakens the regression analysis. A weak regression result has

[45] *Id.*

[46] *Report and Order* at para. 212.

consequences, discussed below,[47] for the appropriate design of the proposed cost caps. Enriching the independent variable database will improve the reliability of the regressions, improve the fairness of the caps, and reduce the probability that support to some high-cost carriers will be insufficient in violation of Section 254.

a. Soils data are not considered in the FNPRM methodology even though a soils variable has been considered by the Commission in past support mechanisms and soils can greatly affect construction costs.

The *FNPRM* methodology takes no account of soils, even though rocky and shallow soils can greatly increase construction costs. NRIC's *Capex Study* found that soils texture was statistically significant when considered by itself, although less so when used in a multivariate analysis.[48] Soils conditions have also been considered in past Commission support mechanisms. For example, the Commission's current forward-looking cost model for price cap carriers' USF is based on a regression study that demonstrated that "combined rock and soil type" had a reliable effect on buried copper costs.[49]

The *FNPRM* sought comment on sources of other soil data that completely cover all the study areas or how to handle those study areas in which the Soil Survey Geographic ("SSURGO") data are missing or incomplete.[50] Map 1, shows the availability of the "Soil Survey Geographic ("SSURGO") Database.

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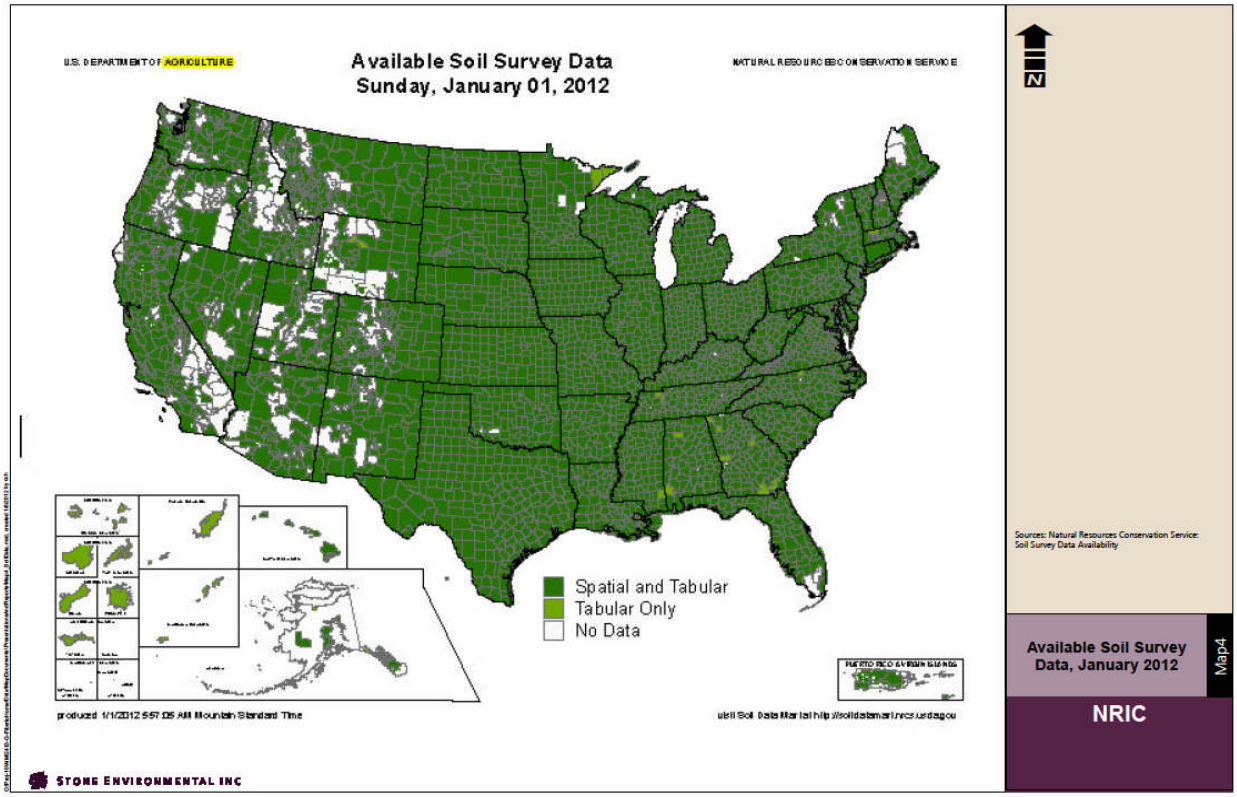
[47] *See*, Section IV.C.

[48] *Capex Study* at 17-18.

[49] *Federal State Joint Board on Universal Service*, Tenth Report and Order, FCC 99-304 (Oct. 1999), para. 123.

[50] *FNPRM* at para. 1083.



Map 1. Available Soil Survey Data, January 2012

SSURGO is the most detailed level of soil mapping done by the Natural Resources Conservation Service ("NRCS"), an agency within the U.S. Department of Agriculture. As Map 1 shows, the majority of the lower 48 states have fully mapped SSURGO soils data.[51] The SSURGO data are delivered by county, multiple counties, or parts of multiple counties, and are sometimes called the "county level" soils data.

NRCS also maintains a smaller scale (larger area) soils database called the "U.S. General Soil Map" ("STATSGO2"). This map is of a broad-based inventory of soils and non-soil areas that occur in a repeatable pattern on the landscape and that can be cartographically shown at the larger scale used for this statewide soils database. STATSGO2 data are available for the

[51] *See* http://soils.usda.gov/survey/geography/ssurgo/description.html.

conterminous United States, Alaska, Hawaii, Puerto Rico, and the U.S. Virgin Islands. Individual state extents are also available. Individual state reports are also available.[52]

In light of the availability of this data, NRIC specifically recommends that:

- When performing regression studies that underlie the cost caps, the Bureau should use SSURGO county-level soils data. At minimum, this data would include soil texture and bedrock depth values. Study areas without detailed SSURGO data should be excluded from the data set.
- When applying caps to particular study areas, county level SSURGO data should be used, if available, and STATSGO2 data should be used elsewhere.

b. The Commission has not demonstrated that its terrain proxies are reasonable or accurate.

For wireline carriers, rugged terrain can increase route lengths and thus increase cost making it more costly to install both buried and aerial plant. The *FNPRM* asserts that the Commission's proposed methodology contains one or more proxies for terrain,[53] and in particular, that land area and percent water are "rough indicators of terrain-driven costs."[54] However, there is no evidence that these "proxies" are accurate. While large census blocks tend to be sparsely populated, they do not necessarily have rough terrain. Deserts have large census blocks, but they may or may not have rough terrain. The Commission has not adequately explained, much less demonstrated, how land area and percentage water can possibly be a proxy for terrain.

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[52] *See* http://soils.usda.gov/survey/geography/statsgo/description.html.

[53] *FNPRM*, Appendix H, at para.19.

[54] *Id.*, Appendix H, at para.27.

The Commission had terrain data available to it when it previously published the *Broadband Availability Gap* paper 21 months ago.[55] In that paper, the Commission recognized that rugged terrain increases costs for both wireline and wireless providers.[56] The unexplained omission of terrain data, therefore, represents another significant omission that undermines the Commission's proposed regression analysis.

c. Frost is not considered in the *FNPRM* methodology even though it has an impact not only on initial construction costs but also on maintenance costs.

NRIC's study of capital expenditures included a "frost index" to account for the percentage of the year in which the ground is frozen. The study found the frost index to be statistically significant.[57] Northern areas with long winters generally have a short construction season, and outside plant projects must be scheduled during the relatively busy and costly warmer months. Moreover, northern areas can have more costly maintenance for outside plant that has to withstand ice and snow. The *FNPRM* fails to explain why the Commission has not taken account of the length of time each year that ground is frozen, or, for that matter, any other climate variable. This lack of explanation further calls into question any real-world confidence in the methodological approach the Commission has chosen to pursue.

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[55] FCC, *The Broadband Availability Gap, OBI Technical Paper No. 1*, (April, 2010) at 69 (classifying terrain into four categories: flat, rolling hills, hilly, and mountainous).

[56] *Id.* at 76 (rugged terrain can drive fiber costs upward even more than wireless costs), 96 (fiber installation costs range from $10,000 to $150,000 per mile, depending on a variety of factors including deployment methodology, terrain and labor factors).

[57] *Capex Study* at 18.

d. Wetlands are not adequately considered in the *FNPRM* methodology.

NRIC's capital study included an independent variable for "wetlands percentage" of area, which it found to be statistically significant.[58] Construction of plant through wetlands requires more permits and requires specialized construction techniques. The Commission has failed to explain why the *FNPRM* methodology has not taken account of this factor.

While the *FNPRM* does consider the percentage of water ("PW") in an area, the relationship between PW and wetlands is unknown. Moreover, PW was significant in only two of the 11 regression studies in Table 1 of Appendix H in the *FNPRM*. It is extremely doubtful, therefore, that PW contributed significantly to the *FNPRM's* analysis or that it serves as a reliable proxy for the presence of wetlands.

e. Road crossings are not considered in the *FNPRM* methodology even though the number of road crossings was shown to significantly affect cost in NRIC's *Capex Study*.

NRIC found that the frequency with which installed plant crosses other roadways is an important cost factor in new construction.[59] The *FNPRM* does not take into account this factor, even though the data can be quickly derived with GIS technology from a nationwide road network databases. As a result a significant question is once again raised with respect to methodological accuracy of the proposed regression analysis that the Commission has presented.

[58] *Id.* at 17.

[59] *Id.* at 18.

3. The Maps Underlying the Regression Studies Do Not Reflect Actual Study Area Boundaries.

The Commission's regression analysis was performed at the study area level. The Commission derived study area boundaries from a commercial data source, the 2010 TeleAtlas database. In addition, the Commission derived many of the regression studies' independent variables from the Census. The Commission Staff converted Census data from census boundaries to study area boundaries. Each of these steps, however, introduced a potential error.

NRIC retained a GIS consultant to evaluate these issues within the state of Nebraska.[60] NRIC respectfully submits that mapping errors are so serious that the Commission should not proceed further with caps until these errors are resolved. To establish caps based on the current database creates a serious risk of producing caps that are in error, and thus, contrary to Section 254 mandates, result in insufficient and unpredictable support.

a. The maps that the Commission used to translate Census data to exchange areas are highly unreliable.

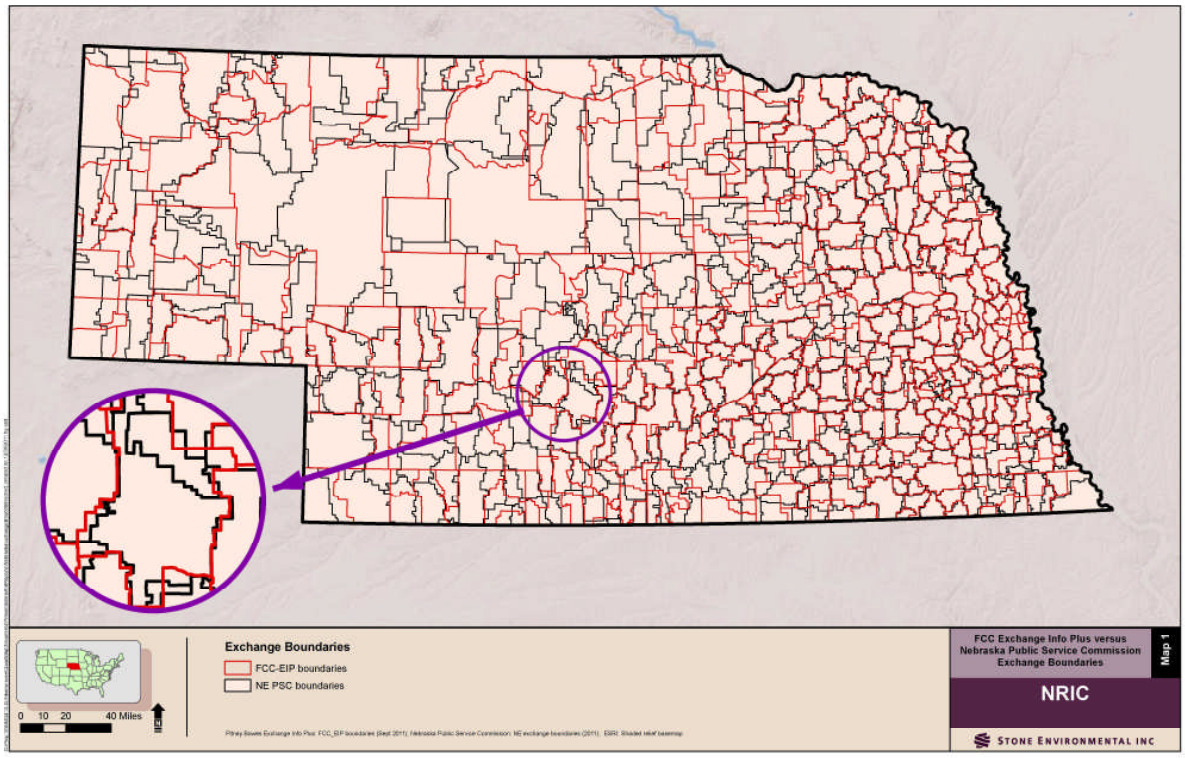
NRIC's first task was to evaluate the accuracy of the commercial TeleAtlas database. NRIC purchased the current equivalent of this database[61] and compared it to the exchange boundary map published by the Nebraska Public Service Commission (the "Nebraska PSC"), which NRIC utilized in January 2011. NRIC members previously worked closely with the Nebraska PSC and other parties to build this map, and NRIC believes the Nebraska PSC map is

[60] NRIC used Stone Environmental Inc. of Montpelier, Vermont for this purpose.

[61] NRIC could not purchase the same database that the Commission used. Since the Commission purchased its data in 2010, a new company has acquired this database, and the 2010 edition is no longer offered to the public. NRIC, therefore, purchased from Pitney Bowes Corporation the September, 2011 version of that database for Nebraska now called "Exchange Info Plus." It is reasonable to assume that the quality of this current edition is comparable to the 2010 version.

the most accurate and current data available. Thus, NRIC used the Nebraska PSC map as a standard for comparison.

Map 2, titled "FCC Exchange Info Plus versus Nebraska Public Service Commission Exchange Boundaries," compares the two boundary data files.



Map 2. FCC Exchange Info Plus versus Nebraska Public Service Commission Exchange Boundaries

Map 2 shows that the commercially available map of service area boundaries used by the Commission has features that are significantly different from those shown on the Nebraska PSC map.

- The most obvious difference is in the number of exchanges. The Commission's TeleAtlas GIS data contains 459 unique exchange boundaries, but the Nebraska PSC shows 514 unique exchange boundaries.

- Even when the two data sets agree on the presence of an exchange, they sometimes differ dramatically as to where those boundaries are located. The inset in Map 2 illustrates some of these significant boundary differences.

Table A, attached to this filing, lists all exchanges from both sources by ROR ETC name, and shows the differences between the TeleAtlas map and Map 2 above regarding housing unit counts, areas and housing density data. Inspection of Table A provides insights into how profound the differences are between the data used by the Commission and actual, real world data. NRIC contends it is reasonable to assume that if the TeleAtlas maps are faulty for Nebraska, such maps likely are similarly problematic for other states. Errors of the magnitude found for Nebraska, when expanded to the nation as a whole make it certain that the Commission used a faulty data set to map census data into study areas.

Accordingly, the Commission should conduct a new analysis using the best available data. NRIC believes that most states have up-to-date exchange boundary maps, available from either the state commissions or the state telephone associations.[62] NRIC respectfully recommends that the Commission request these new maps and then conduct new regression studies using this more accurate exchange boundary data to map Census data into study areas. Relying on inaccurate commercial mapping data would likely produce arbitrary caps that result in insufficient and unpredictable support and that deter investment in broadband. Further, such faulty data will certainly make the caps highly susceptible to legal challenge.

b. The Centroid Method that the Commission used did not create material errors in Nebraska, but could in other states.

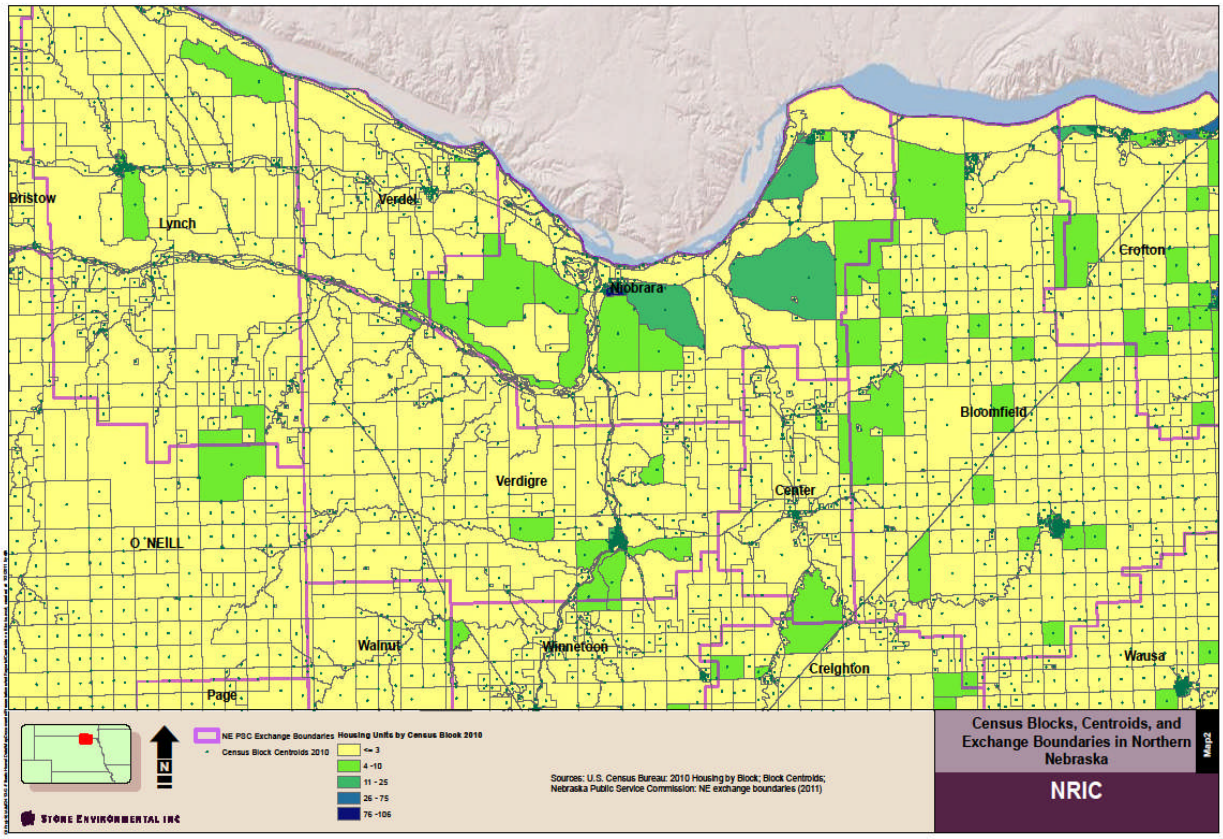
[62] In some cases, these maps are prepared under supervision of the state utility commission. In many states, other agencies do the mapping work.

NRIC also tasked its GIS consultant to evaluate the use of the "Centroid Method." In calculating the proposed investment and operating expense caps, the Commission used Census data attributable to census blocks. To map these data to study areas, the Commission used the "Centroid Method.[63] A centroid is the geographic center of a census block. The Centroid Method requires attribution of all of a census block's housing, area and population to the study area that contains the census block's centroid.

NRIC notes, however, a possible problem arises with "split blocks" where a census block is partly in one study area and partly in another. By placing a portion of that census block's housing, area and population in the wrong service area, the centroid method can distort housing, area and population data for both affected service areas. NRIC observes that these errors would not necessarily cancel each other, since the regression model uses some independent variable data collected from the Census and some independent variable data collected from carriers. Thus, attribution errors for Census data could create material mismatches. Placing too many or too few housing units in a study area would affect the ROR ETC's cost caps, possibly leading to an unduly stringent cap and insufficient support.

Map 3, Sample Nebraska Split Census Blocks, displays graphically the frequency of split blocks in a portion of northern Nebraska. Visual inspection of the map shows that because of the large number of census blocks, the great majority of census blocks fall entirely within a single exchange, but a small percentage of census blocks are split between two exchanges. Nonetheless, the mismatch issue noted above cannot be ruled out.

[63] *FNPRM*, Appendix H, at para. 21.



Map 3. Sample Nebraska Split Census Blocks

NRIC performed a GIS and statistical analysis of how the Centroid Method affects the measurement of housing and population in Nebraska, applying two methods to map Census population and housing data from census blocks to exchanges and using the Nebraska PSC exchange boundary map as the source for exchange boundaries.[64] This analysis included:

- The Centroid Method replicated the Commission's work, but using the Nebraska PSC exchange map. The Centroid Method produced a modified exchange boundary map in which the exchange boundaries are segments of census block boundaries, but are selected to be close to the service area boundaries. All

[64] As noted above, NRIC did not have the 2010 TeleAtlas data, and the more modern version of that commercial map was less accurate than the Nebraska PSC map.

population and housing in the census block was assigned to the exchange in which the census block centroid was located.

- The GIS Method used a GIS software tool (ArcGIS v10.0) to divide split Census Blocks into two areas, and then allocated population and housing to the appropriate exchange based on surface area.

The results of these methods were analyzed in two ways. First, NRIC considered the variations in the attributed data for housing units and density. This analysis looked at all census blocks, including blocks contained entirely within a single study area. This analysis concluded that the two methods produced nearly identical results. For both housing units and density, the Pearson correlation between the two data sets exceeded 0.999.

Next NRIC examined exchanges where the two methods produced a substantially different result. In approximately 10% of the exchanges in Nebraska, the area method assigned population or housing units that were at least 5% greater or 5% less than the Centroid Method's results. These outlier exchanges typically are either rural or remote,[65] or they have a small area.[66]

The Centroid Method did not frequently produce any substantial errors in the estimates of exchange population or housing units. Of course, these errors may tend to cancel in study areas with multiple exchanges. Many of the split census blocks have three or fewer housing units; therefore, any portion of a census block's population or housing units erroneously assigned to the wrong exchange is likely to have a small effect on exchange totals.

[65] Most of these areas were in western Nebraska.

[66] Most of these areas are in southeast Nebraska, where exchange size is smaller than average. Where exchange areas are small, a census block will be a larger portion of the exchange's area, and a centroid error will generally be more consequential.

In Nebraska, NRIC concludes that for most study areas the Centroid Method's errors are not likely to be material to the cost caps. The high overall correlation between the two methods is the chief support for this conclusion. In addition, the small number of residents and housing units in most rural Nebraska split census blocks means that any mapping error is likely to have only a small impact on the independent variables used in determining a carrier's cost caps.

Nonetheless, NRIC observes that the possible effects could be significant for some carriers. For other states where ROR ETCs' service areas are smaller and more densely populated, the Centroid Method could cause material errors. Any error in measuring Census data could lead to inappropriate carrier caps and ultimately to insufficient support. The problem could be particularly important for carriers serving small geographic areas and those not currently subject to a cap but with little "headroom" above their current spending levels.[67] Accordingly, NRIC recommends that the Commission provide a remedy for a ROR ETC that perceives itself harmed by the Centroid Method's mapping error. To the extent that a carrier can show that the Commission's calculations of its study area's Census characteristics have been materially distorted by use of the Centroid Method, the Commission should substitute the GIS Method when translating the Census inputs used to determine that carrier's individual cost caps.

C. The Commission's Regression Methodology Is Deeply Flawed.

The *FNPRM* demonstrates numerous and serious errors in the regression methodology that underlies the proposed caps. NRIC respectfully submits that these errors are sufficiently serious that caps resulting from the current analysis would lead to unpredictable and insufficient support for some carriers.

[67] *See* Section IV.C.1 for a discussion of the effects of first becoming subject to a cap, the concept of "headroom" and the concept of a cap "cliff."

1. Quantile Regression's Complexity Will Harm Predictability.

The *FNPRM* sought comment on QR analysis as a methodology.[68] As a general matter, NRIC has no dispute on a theoretical basis with the use of QR analysis as a statistical methodology. Nevertheless, NRIC maintains that the QR that the Commission has proposed is improper.

NRIC fully appreciates the suggestion in the *FNPRM* that QR has some advantages over OLS analysis. First, OLS assumes that deviances from the regression line are normally distributed. This assumption is justified in many situations because the error terms are caused by many random factors omitted from the model.[69] Data that are skewed to one side of the distribution are not normally distributed, and thus, QR would be more appropriate for such data sets. Similarly, in QR there is no need to correct for heteroscedasticity.[70] This problem alone, however, is not sufficient to reject OLS, because standard techniques exist to correct for heteroscedasticity in OLS analyses. Second, QR compares groups of similarly situated companies. Thus, a properly constructed QR methodology allows the independent variables to have different effects in the different quantiles. For example, if the number of housing units in a rural area increases, QR allows the size of the study area's cost increase to differ from one quantile to another. In other words, QR has variable elasticity over the full range of data. OLS

[68] *Id.*, at para. 1082.

[69] John Neter and William Wasserman, *Applied Linear Statistical Models* (Homewood, Illinois: Richard D. Irwin, Inc., 1974), p. 47.

[70] Hetersoscedasticity is the tendency of a population to contain sub-populations with different variabilities or statistical dispersion. Heteroscedasticity can invalidate statistical tests of significance that assume the effect and residual variances are uncorrelated and normally distributed.

cannot achieve this result because it assumes constant elasticities over the full range of output data.

One of the central features of QR, however, may or may not be an advantage. The *FNPRM* asserts without explanation that QR's reduced sensitivity to outlying data is an advantage of QR. That conclusion cannot be assumed. NRIC recognizes that under OLS, the regression line is more influenced by outlying data [71] and could cause a misleading conclusion if outliers are caused by a mistake or an extraneous cause. In contrast, outlying data points influence QR results in a less significant way. It is also equally true that outliers can convey significant information, especially when there is an interaction with another independent variable omitted from the model.[72] Similarly, application of a methodology, such as QR, that discounts extreme cases raises significant concerns when it is being applied to a program, such as the USF, with the explicit aim of providing support to extremely costly areas. Consequently, applying QR to the USF program creates a risk that the regression will understate the inherent variability of the data due to variables being omitted from the model, thus creating unduly stringent caps.

Other substantial disadvantages also exist with respect to applying QR to the current USF program. First, QR is far more complex than OLS. While QR has been used frequently in academic circles, it is not entirely transparent and is not commonly used within industry. As a result, significant concerns are raised as to whether QR tends to increase actual and perceived uncertainty with its results, both of which would tend to inhibit a carrier's willingness to invest

[71] OLS minimizes the sum of squared residuals (difference between the estimated value and the actual value for each observation) from the regression line. QR minimizes the sum of absolute residuals from the regression line.

[72] A safe rule is to discard an outlier only if there is direct evidence that it represents an error in recording, a miscalculation, a malfunctioning of equipment or a similar type of circumstance.

in broadband facilities. This consequence of QR is directly at odds with one of the Commission's over-arching objectives of encouraging the deployment of broadband facilities.

Second, the annual recalculation of caps using QR will create extraordinary financial uncertainty. A ROR ETC that is not subject to any of the 11 caps in one year would lose a substantial amount of support if it were to become subject to just one cap in the succeeding year.

As discussed below,[73] it is only logical that a carrier will need to know whether it has "headroom" for additional costs before falling off this "cliff." By using QR to define the cap, the Commission has made it much more difficult to determine a carrier's headroom and the answer to that question cannot be obtained without professional assistance from a statistician.[74] If the Commission is going to use QR, NRIC respectfully recommends that the Commission should provide individual ROR ETCs with annual updates on their "headroom" below the caps.

As the above discussion demonstrates, NRIC has concluded that overall the use of QR is more likely to reduce the predictability of USF disbursements and thus will likely inhibit appropriate investment, contrary to the Commission's stated goal. Rational and prudent public policy demands that in fulfilling its statutory mandate to ensure predictable USF funding levels, the Commission should ensure that a ROR ETC knows *before the fact* that a particular investment or expense level will be acceptable. A system based on QR is wholly *non-transparent* in this regard and therefore far less predictable than a system based on OLS, and thus runs counter to the Commission's goal.

This result, in turn, stands in stark contrast to the rules for price cap carriers. Under the *Report and Order*, price cap carriers have advance knowledge of future support levels for a

[73] *See,* Section V.C.6.

[74] Even then, predicting future caps requires one to predict future or current behaviors of other carriers.

period of five years or more. This high level of predictability has not previously been available to ROR ETCs under the HCLS cap, and the new regression caps heighten that unpredictability even further. The conclusion, therefore, is inescapable: In large part because of the new proposed caps and how capped funds will be redistributed, a comparable level of predictability to that given price cap carriers will not be available to ROR ETCs. Since ROR ETCs are smaller than price cap carriers and generally serve more sparsely populated areas, it is important the ROR ETCs be given at least as much, if not more certainty, in their support in order to encourage investment. Without such predictability, the Act's requirements in this regard are ignored.

On balance, therefore, NRIC recommends that the Commission proceed carefully in applying QR as the basis for cost caps. The above discussion demonstrates that it is far from clear that QR has advantages that outweigh its disadvantages and the significant flaws vis-à-vis the Section 254 statutory mandates of sufficiency and predictability which raise particularly troubling issues.

2. The Commission's Regression Analysis Erroneously Included Many Insignificant Independent Variables.

The *FNPRM* describes a uniform regression structure in which the same 11 input variables are used to predict 11 separate cost factors. Several of these independent variables were retained, notwithstanding their low significance, because of their relationship within families of so-called "parent" and "child" variables. Extending that metaphor, the Commission decided to retain every variable that had a "sister" variable which was found to be significant in at least one of the 11 regression studies.[75] For example, the Commission retained "Land Area in Urban Clusters" as an independent variable in all 11 regression studies because "Land Area in

[75] *Id.*, Appendix H at para. 22.

Non-Urbanized Areas," a totally different sister variable, was significant in a few of those 11 studies. This indiscriminate inclusion of independent variables is unprecedented in NRIC's experience and is statistically invalid. The Commission explained that it used all these variables "because the goal of the regression was not to determine statistically significant correlations, but instead to generate 90th percentile predictions, which are unaffected by the addition of insignificant variables."[76] In other words, the Commission thought the extra variables did no harm. That conclusion is clearly erroneous.

NRIC respectfully submits that a properly conducted regression study seeks to shorten the list of independent variables, thereby obtaining a parsimonious model, while also seeking to make reliable predictions. Not only is indiscriminately including variables without regard to their statistical significance clearly in error from a statistical standpoint, but a regression using a large number of independent variables creates the following risks:[77]

- An "over-fitted" model with independent variables that are too closely tied to the particular data set used may not generalize to other data sets.
- Multi-collinearity among the independent variables[78] can obscure the predictive power of the regression model,[79] and thus detract from its descriptive abilities.

[76] *Id.*, Appendix H at para. 21.

[77] *See generally*, Neter and Wasserman *supra*, at p. 372.

[78] "Multi-collinearity" refers to situation in which two or more independent variables in a multiple regression model are highly correlated. In this situation, the regression coefficient of any particular independent variable depends on the presence of other independent variables. Thus, a regression coefficient does not reflect the inherent effect of the particular independent variable has on the dependent variable, but only a marginal or partial effect, given whatever other correlated independent variables are included in the model.

[79] For example, including both loops and housing units as independent variables will make it difficult to interpret how the variables affect the outcome. Suppose one were interested in the effect of size on costs. One might hold all other factors constant and increase the number of loops.

There are tests for multi-collinearity, but the Commission has not explained why it did not perform those tests.

- The dynamics underlying the independent variables, the underlying forces that raise or lower carriers' costs, become obscured. The implicit cost equation can become incoherent, particularly when logarithms are used.
- The chance that a truly significant variable will be dismissed (a "false negative" conclusion) increases if it is evaluated in the presence of many other variables, particularly if multi-collinearity exists.[80] To avoid this risk, the Commission would need to evaluate how the addition of independent variables one at a time, increase the R-squared of the equation. The Commission has not explained why it apparently did not conduct such an analysis.
- The chance that an insignificant factor will, at random, incorrectly be found to be significant (a "false positive" conclusion) is increased. With 11 input variables, there is more than a 40% chance that some variable is incorrectly found to be significant. [81]
- Too many variables can increase the effects of measurement and rounding errors.

The regression formula then would predict increased costs. However, with the proposed variable structure it is impossible to hold all other variables constant when loops increase because housing units are closely related to loops.

[80] For example, when the Commission tested to see if weighted density was a significant variable, land area and loops remained in the variable list, which may have caused weighted density to not be significant.

[81] Type I Error, sometimes known as a "false positive" result, would occur in this context when the model shows that an independent variable is associated with cost, when there is no association in fact. The Commission tested at the 95% confidence level. Therefore, the probability that a Type I Error will occur in any one of the models is 5%, so the probability that significance is found in at least one of the models just by chance is 43% (i.e. 1-Pr(X=0|n=11, p=.05) = 0.431 where X = the number of models where the variable is significant; X ~ binomial (n, p)).

In the Commission's proposed regression analysis, which involves using the same 11 variables in 11 different regression studies, inclusion of insignificant variables is a clear methodological error. Yet as Table 1 of Appendix H demonstrates, Census variables were significant in only 26 of 110 cases, less than one case in four. Indeed, for the AS13 regression, not a single Census variable was significant in the analysis, although ten were used.[82] Clearly, to conduct a regression study in this fashion creates substantial error.

The failure to reject insignificant variables apparently was motivated by the desire to achieve the highest possible R-squared value.[83] Rather than seeking the equation with the highest R-squared value, the Commission should be seeking a parsimonious equation with all independent variables being significant.[84] It is helpful to consider the definition of R-squared and how it behaves when more variables are added to a regression. Adding more independent variables to a model can only increase its R-squared and can never reduce it.[85] Many more insignificant variables could be added to a regression equation, each of which would have slightly improved the R-squared value, but those variables would not necessarily belong in a properly constructed regression equation. Even if the ratio of dogs to cats in a carriers' service

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[82] *FNPRM*, Appendix H, Table 1.

[83] *R-squared = 1 – (Error Sum of Squares / Total Sum of Squares)*. R-squared is defined as the percentage of the dependent variable's variance that is attributable to the independent variables. A value of R-squared relatively close to 1.0 sometimes is taken as an indication that sufficiently precise inferences on the dependent variable can be made from knowledge of the independent variables. Neter and Wasserman *supra*, at pp. 77, 239.

[84] *Id.*

[85] The numerator *Error Sum of Square* ($\sum(Y_i - \hat{Y})^2$) can never become larger with more independent variables. The denominator *Total Sum of Square* ($\sum(Y_i - \bar{Y})^2$) is always the same for a given set of data. Here Y_i is the dependent variable, $\hat{Y}$ is the estimate of the dependent variable derived from regression, and $\bar{Y}$ is the average of the dependent variable.

area increases the R-squared result, that particular variable has no discernible relationship to carrier cost, and it should not be included in a regression formula aimed at limiting carriers' cost.

3. Transforming Most Variables Using Logarithms Was Not Explained and May Harm Low-Density Areas.

The *FNPRM* and Appendix H propose 11 cost caps based on 11 regression studies. All of the regressions express both the dependent variable (cost) as a logarithm and most of the independent variables in logarithmic form.[86] This kind of regression is called a "log-log regression." The Commission has not demonstrated that the use of a log-log regression was statistically appropriate.

a. "Linearizing" the Model Has Not Been Shown to Be Necessary.

The Commission explained that logarithms were used to "linearize the model."[87] However, the Commission has not explained what part of the cost function was not linear. Whether a linear regression function is appropriate can often be studied from a scatter plot of the data. Linear regression models are not restricted to linear response surfaces; rather the term "linear" refers to the fact that the model is linear in the parameters.[88]

By plotting the residuals[89] against the independent variable, one can see if the residuals depart from zero in a systematic fashion, which indicates that a linear regression is inappropriate.

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[86] Each of the 11 studies uses the same 11 independent variables, ten of which are also expressed in logarithmic form. *FNPRM*, Appendix H, at para. 13. The Commission actually added "1" to the value of the raw variable before taking the logarithm. For simplicity, that additional step is disregarded in the following analysis.

[87] *Id.*, at paras. 18 and 19.

[88] Neter and Wasserman *supra*, at p. 221.

[89] Dependent Value – Regression Fitted Value = Residual

When the error terms are independent, the residuals will fluctuate in a more or less random pattern around the baseline of zero. A transformation of the dependent variable is appropriate only when the distribution of the transformed dependent variable for a given independent variable is normal with constant variance. This assumption should be tested.[90] Nothing in the *FNPRM* suggests that the Commission performed this essential task before deciding to use the logarithm of the dependent variable in the regression equation.

b. Using a Log-Log Regression Is Inappropriate for Cost Functions Based on the Independent Variables Used in the *FNPRM.*

The Commission should not transform a variable for its regression studies (such as by taking its inverse or its logarithm) except where it first determines that the transformation better matches the structure of the response surface. Using a log-log form is appropriate when the dependent variable is a function of several independent variables that are known to have a *multiplicative relationship*.[91] The *FNPRM* gives no basis to conclude that the independent

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[90] Neter and Wasserman *supra*, at pp. 123, 130.

[91] If the regression equation for cost is log-log (of the form $Ln(Cost) = a*ln(X) + b*ln(Y)$), then, by the properties of logarithms, $Cost = X^a * Y^b$. Thus, although the regression equation is linear, the underlying cost equation is multiplicative.

An example is the "Cobb-Douglas cost function," which describes total cost (Y) as a product of three factors, A, L, and K, and two exponents:

$$Y = A*L^{\alpha}*K^{\beta}$$

By taking the logarithm of both sides, the equation becomes:

$$Ln(Y) = ln(A) + \alpha*ln(L) + \beta*ln(K)$$

This equation is linear in form and can properly be studied using linear regression techniques.

variables have such a relationship; therefore, the use of logarithms to transform the variables was arbitrary.

In fact, a review of the specific cost variables shown in Appendix H cannot possibly have a multiplicative relationship. The Commission has not explained how (1) the number of census blocks in non-urban areas, (2) the number of census blocks in urban clusters, and (3) the number of census blocks in urbanized areas could possibly be combined by multiplication (or division) to produce a sensible cost function.[92] Yet by relying on a log-log regression and the multiplicative relationship among independent variables inherent within it, that is what the Commission is implying.

Log-log regression equations behave in a unique way as independent variables change. In normal linear regressions, as an input variable increases by a fixed amount, the output or dependent variable also changes by a fixed amount. With log-log regression, however, this linear relationship is replaced by a proportionality relationship. When the input variable increases by a fixed factor or ratio, the output variable also increases by a different ratio equal to the input factor's ratio raised to the power of the correlation coefficient.[93] This proportionality relationship holds regardless of the values of the other independent variables in the regression. For a cost equation function using the independent variables shown in the *FNPRM*, this behavior produces wildly inappropriate results.

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[92] NRIC notes that in Appendix H, Table 1, "Census_blocks_nu" are shown three times in separate rows. NRIC assumes this is a typographical error since three different variables are shown in Table 2 on the next page.

[93] *See generally*, FAQ: How do I interpret a regression model when some variables are log transformed? UCLA: Academic Technology Services, Statistical Consulting Group, from http://www.ats.ucla.edu/stat/mult_pkg/faq/general/log_transformed_regression.htm (accessed December 5, 2011).

Log-log regression also becomes problematic when the regression coefficient is close to zero, as many are in Table 1 of Appendix H. In a log-log regression of cost, a regression coefficient near zero means that the independent variable has only a small effect on cost. Consider the effect of the variable, non-urban land area, has on AS1, gross investment in cable and wire facilities.[94] The regression coefficient for this pair of variables is 0.163.[95] As a matter of algebra, any given proportional increase in the non-urban land area of a study area will affect AS1 by that same factor raised to the power 0.163.[96] However, 0.163 is close to zero and any number raised to an exponent near zero will approximate one. Thus, a large proportional change in non-urban land area will have only a small proportional effect on predicted cable and wire investment. Specifically, non-urban land area is included in the regression equation, but its effect is almost negligible.

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[94] Factor AS1 is defined by NECA as gross investment in cable and wire facilities, plus the C&WF portion of capital leases assigned to Category 1. AS1 is typically a large variable that has a major influence on a carrier's HCLS support.

[95] *FNPRM,* Appendix H, Table 1.

[96] Using "Z" to represent outcome AS1, "LA" to represent land area, and "k" as a constant, and holding other independent variables constant, the log-log regression equation is:

$$ln\ (Z) = k + 0.163 * ln\ (LA)$$

Suppose we take two values of land area, LA_1 and LA_2, and hold the other predictor variables at fixed values. By subtracting one equation from another, we obtain:

$$Ln\ (Z_1) - ln\ (Z_2) = 0.163 * [\ ln\ (LA_1) - ln\ (LA_2)\ ]$$

This equation can be simplified to:

$$ln\ (Z_1 / Z_2) = 0.163 * ln\ [\ LA_1 / LA_2\ ]$$

and finally to:

$$[\ Z_1 / Z_2] = [LA_1 / LA_2]^{0.163}$$

Any increase of 100% in non-urban land area will increase AS1 by 12%.[97] This result contradicts simple logic because if a carrier's service area doubled, common sense would indicate that the carrier's cable and wire facilities investment, a primary component of a carrier's investment and generally a large amount, would need to increase dramatically unless the new land area had no, or very few, end users requiring service. However, under the Commission's log-log regression, cable and wire facilities investment would only increase by 12%.

Similarly, an increase of non-urban land area by a factor of 100 will increase AS1 by a factor of 2.12,[98] which is a similar nonsensical result. This example illustrates the problem that the Commission's results understate the costs of serving areas with extremely sparse populations.[99] If this kind of result cannot be explained, the Commission's proposed regression analysis must be rejected because it clearly will risk granting insufficient funding in violation of Section 254.

4. A More Reliable Regression Model Is Available, Which Includes Density and Does Not Include a Logarithmic Transformation.

The Commission's variables suffer from both problems of multi-collinearity and heteroscedasticity. Rather than resolving these issues by elimination of variables, the Commission further confused the situation by including a logarithmic transformation of the variables. The Commission should transform a variable for its regression studies (such as by

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[97] $[2]^{0.163} = 1.120$

[98] $[100]^{0.163} = 2.12$

[99] Similarly, the non-rural land area variable has a weak relationship to the other 11 output variables in Appendix H. The regression coefficients, shown in Appendix H, Table 1, range from 0.0835 to 0.222. *FNPRM*. As noted above, in log-log analysis, $[Z_1 / Z_2] = [LA_1 / LA_2]^{\alpha}$. If α=.0222, then a 100-fold increase in non-urban land area would increase Z by only 178%.

taking its logarithm) only if it first determines that the transformation improves the reliability of the regression (increases the pseudo R-squared). NRIC tested this question using the Commission's input data. NRIC studied dependent variable AS1, which is each carrier's gross investment in Cable and Wire Facilities used for Category 1.3 services. NRIC was able to produce an R-squared of 0.80, which even though not directly comparable, arguably is an indicator of a far better fit than the 0.59 value reported in Table 1 of Appendix H that was based on a log-log regression.[100] NRIC's regression study used OLS statistical methods rather than QR[101] and found the significant variables to be (in declining order of significance): Total Loops, Non-urban Land Area, Water Area, Weighted Housing Density, and Urbanized Land Area. Similar results using the same independent variables were obtained for the dependent variables of Total Loop Cost and Operating Expense Cost. [102] However, because of the underlying data issues with service area boundaries and the lack of other geographic data, the regressions produced by NRIC still would not provide reasonable results.

While transforming variables is a reasonable statistical practice, it should be done only when the analyst knows other problems with the model, such as multi-collinearity of variables and heteroscedasticity, have been resolved or if the analyst believes the relationship among variables is multiplicative. After using a transformation, the analysis should test that the residual terms are normally distributed with mean zero and have constant variance. While NRIC knows that the Commission's proposed regression analysis suffered from both multi-collinearity of variables and heteroscedasticity, NRIC does not know if the Commission performed the required

[100] *FNPRM,* Appendix H, Table 1.

[101] When QR methods were used, the R-squared produced was only 0.70.

[102] All NRIC regression equations have R-squared statistics between 0.76 and 0.81.

test of residuals. The R-squared statistics show NRIC's regressions that did not use logarithms predict costs better than does the Commission's model. Consistent with common sense, NRIC's regressions include density as a significant variable, while the Commission's model does not.[103]

5. The Commission's Regression Results Are Not Robust.

Appendix H to the *FNPRM* reports the results of 11 regressions. The pseudo-R-squared values range from 0.27 to 0.59.[104] At best, these results are not robust, at worst, meaningless. Even in the best case, 41% of the variance of the data is unexplained. In the worst case, 73% of the variance is unexplained. None of these pseudo R-squared values is high enough to demonstrate that the Commission has even identified the principal drivers of actual costs.

When NRIC filed its earlier studies of capital expenses, the final R-squared was 0.866.[105] Reliability results for NRIC's *Opex Study* were lower, at 0.68, and NRIC was somewhat troubled that it had not reached a R-squared of 0.70. It is not clear that the regression results reported in the *FNPRM* are far less able to predict costs and therefore should not be used to establish cost caps.

6. The Regression Analyses Did Not Properly Control for Size.

The Commission's regression results, weak as they are, are also inflated by the fact that the variables are not scale-independent. The pseudo-R-squared values reported in the *FNPRM*

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[103] One only needs to consider what areas that are unserved by broadband to conclude that density is a significant cost driver. Densely populated cities and town have broadband, and may have multiple broadband providers, but sparsely populated rural areas are frequently unserved or underserved.

[104] *FNPRM,* Appendix H, Table 1.

[105] *Capex Study* at 18.

are largely an artifact of the obvious proposition that study areas with a large number of loops also have high total cost. However, a study area with high total costs could also have few customers. In each regression study reported in Table 1 of Appendix H, the number of loops was significant at the 0.001 level and was more significant than any other variable.[106] Moreover, many of the other independent variables used in these studies are highly correlated with population, such as the number of housing units. Consequently, the only inference one can draw from the Commission's regression work is that study areas with many subscribers usually have high total costs.

A second harmful effect of using a scale-dependent output variable is that it distorts the operation of the QR methodology. The *FNPRM* stated that the proposed caps will apply based on how each supported carrier compares to "similarly situated" companies.[107] This claim is apparently based upon the use of QR methodology. However, since the number of loops is the most significant variable in the Commission's analysis, "similarly situated" really means no more than having a comparable number of loops. From the data released by the Commission,[108] NRIC has identified an example of two ROR ETCs, X and Y, both with about 550 lines. Company X has a density of about 810 Household Units per square mile, while Company Y has a density of about 690 Household Units per square mile. Company X has a loop cost of $1,644, while Company Y has a slightly lower loop cost of $1,642. Even though Company Y had a slightly lower loop cost, it is capped by the Commission's regression equations because it

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[106] *FNPRM*, Appendix H, Table 1.

[107] *Report and Order* at paras. 221, 223, *FNPRM* at para. 1080.

[108] *See* Public Notice, WC Docket No. 10-90, *et al.*, DA 11-1966, released December 2, 2011 and http://www.fcc.gov/encyclopedia/rate-return-resources.

exceeded one cap, AL17, Depreciation and Amortization Expense. Company Y has "headroom" under the other caps. Thus, even though the two ROR ETCs appear to be very similarly situated, they were treated differently and the ROR ETC with the slightly lower loop cost was the one penalized by the Commission's regression equations.

A useful regression study would define the dependent variable as a cost per unit served, where the units might be subscriber loops or locations passed. Moreover, cost per loop is the actual variable that inputs into the HCLS mechanism, and predicting it directly should be the single explicit goal of any regression study used to develop a cap on HCLS.

The discussion in Appendix H suggested the Commission is somewhat puzzled by the fact that it could not find density to be a significant variable. This result is readily explained. First, density was tested in a multiple regression study only after a number of other insignificant variables were already in the mix; thus, the influence of weighted density was overshadowed by the other variables. Second, using OLS and without transforming any variables, NRIC tested the ability to predict total cost using loops as the only independent variable.[109] The result was an R-squared of 0.75.[110] This regression test showed that density, weighted or unweighted, would not be significant so long as the dependent variable is total study area cost.[111] When the dependent variable is scale-sensitive, only independent variables that are scale-sensitive, such as the number of loops or the number of housing units, will be significant. In other words, size predicts size.

[109] NRIC also attempted to perform a regression without using logarithms using Total Cost per Loop as the dependent variable. NRIC could not find such an equation using the available data. Presumably this is the reason why the Commission used a logarithmic transformation.

[110] It is also noteworthy that the same regression study, using QR instead of OLS, produced a pseudo R-squared of 0.63, lower than the result using OLS.

[111] The same problem also applies to other variables such as road crossings and soils. These variables will not be significant if the dependent variable is cost and not "per loop cost."

The scale-dependency of the variables means that the reliability of the Commission's regressions are much lower than those reported in the *FNPRM*.

7. The Commission's Regression Methodology Contains Numerous Serious Statistical Errors.

The Commission's regression methodology contains numerous serious errors including the absence of appropriate geographic data, mapping errors, the use of insignificant variables, fail to control for size and lack of robust results. The combined effect of these errors would certainly produce arbitrary caps that would lead inevitably to insufficient support for many carriers. With these final broad failures in mind, NRIC concludes that the regression methodology and results reported in the *FNPRM* are irredeemably and materially flawed. Accordingly, NRIC respectfully suggests that the Commission should redo its regression work. No cost caps can be based on the current work without violating the sufficiency requirements of Section 254. Predictable USF recovery is also an issue since the caps are not well connected to real cost drivers, and carriers will not be able to predict how changes in Census data are likely to affect their cost caps.

V. TO CREATE PREDICTABLE AND SUFFICIENT SUPPORT, CAPS SHOULD BE SET AT A HIGHER PERCENTILE, AND ONLY TWO SEPARATE CAPS SHOULD BE ESTABLISHED FOR ROR ETCS, ONE FOR TOTAL INVESTMENTS AND ONE FOR EXPENSES.

The Commission also asked for comments about several design features of the proposed caps. As demonstrated above, significant questions exist with the Commission's proposed use of QR that relate directly to the resulting caps. Accordingly, the conclusions regarding the QR are inherently related to NRIC's responses to the proposed design of the caps. Although as

advocated above, the Commission should redo its regression analysis, an element of that effort should also be for the Commission to modify its proposed approach to setting caps both annually and at the 90th percentile, as doing so with such frequency and at this level will result in insufficient and unpredictable support. NRIC further recommends that caps on investments must allow for return on investments made under existing rules and that caps should not be applied separately to each of 11 separate categories. NRIC also believes that expense caps should be applied consistently to all expenses, not carving out corporate expenses under a separate methodology as has been done for HCLS and has been extended to ICLS under the *Report and Order*.

A. A 90th Percentile Cap Is Too Stringent Given the Poor Predictive Power of the Commission's Regression Equation.

The *FNPRM* has proposed caps at the 90th percentile level for each of 11 inputs to the NECA HCLS algorithm.[112] As a result, any ROR ETC whose actual costs for any of 11 steps in the NECA algorithm places it above the 90th percentile (compared to similarly situated companies) would have its costs capped at the 90th percentile level. The *FNPRM* asks whether the Commission should set the caps at a lower point, such as the 85th percentile, or at a higher point, such as the 95th percentile.[113]

NRIC respectfully suggests that if the Commission does establish caps on investment and expense, it should use the 95th percentile spending level (or the 98th percentile) as the standard for those caps. The need for this higher percentile directly arises because the Commission's

[112] *FNPRM* at para. 1080.

[113] *Id.*

proposed regression model has not achieved a high level of reliability. The Commission's regression equation's pseudo R-squared statistics, a measure of fit, range from 0.2747 to 0.5931.

Absent taking this action, NRIC respectfully submits that caps based on such poor correlations are too stringent and will produce unpredictable support for all carriers and insufficient USF support for many carriers. Setting a standard at the 95th or 98th percentile will mitigate the harm likely to arise from applying a more stringent 90th percentile cap. A more realistic cap is a prudent and reasonable interim step that will reduce the harm to carriers that have legitimate reasons for their costs.

If the regression results indicated high reliability and were stated with scale-independent variables, NRIC's position may change since the Commission could be confident that spending above a specified cap is simply a carrier's discretionary choice, and that the carrier could safely cut costs. On the other hand, if (as here) the regression model is unreliable, the cap on spending might be the result of a failure to identify important cost drivers for which data are not considered "currently available" to the Commission, such as terrain or climate. Alternatively, low reliability could be caused by mathematical or methodological errors in the model. Whatever the cause of low reliability, a cap that limits USF disbursements based on perceived over-spending would be likely to harm customers, service, or both. Moreover, the harm would fall randomly, depriving carriers of not only sufficient but also predictable USF payments required as a precursor for investment.

For contrast, NRIC notes that the 90th percentile standard is far more demanding than, and cannot be reconciled with, other statistical standards used in federal USF programs. As the *FNPRM* explains, the Commission currently uses two standard deviations as the standard to establish that rates are non-comparable. In a normal distribution, 98% of the cases fall below the

point two standard deviations above the mean.[114] In other words, carriers are presumed to have comparable rates (and be receiving sufficient federal universal service support) unless they fall in the top two percentiles for rates. The Commission has not explained how it can declare in advance that only two percent of carriers have non-comparable rates, but ten percent of carriers have excessive costs. This analysis supports setting a cap level at the 90th percentile will be too severe and curtail support to too many carriers. For the above reasons, NRIC recommends that the Commission initially set the cap at the 95th percentile level rather than the 90th percentile. In future years, if the reliability of the underlying regression analysis improves, the Commission could then review whether to apply the cap at the 90th percentile level. In any case, caps based on regression models that fit the data so poorly should not be implemented until the problems with the regression models are corrected.

B. The Cap on Investment Does Not Allow Carriers to Receive a Return on Past Investments.

A premise of the regression caps is that imposition of the caps will change ROR ETCs' behavior to make carriers "more efficient." Notwithstanding the Commission's regression flaws, the behavior change that is expected to result from the caps cannot occur for investment. While carriers may be able to reduce expenses in response to properly designed caps, carriers cannot reduce investment. Aside from inventory, which possibly could be sold at greatly discounted prices, the bulk of the investment (cable and wire facilities plant and circuit equipment) is already installed. Carriers cannot simply "pull the cable out the ground" in order to reduce their

[114] The *FNPRM* notes that in a normal distribution 95% of the cases fall within plus or minus two standard deviations. *Report and Order* at para. 84, note 123, and *FNPRM* at para. 1026, note 2146. That observation is accurate but irrelevant. Cases falling below minus two standard deviations have no different legal status from cases above that level. Only a one-tailed test is relevant. The relevant question is how many cases fall above the upper tail threshold.

investment level. Therefore, imposition of the Commission's proposed investment caps leaves a carrier with no viable option to ameliorate its situation.

NRIC has previously advocated that the Commission should implement properly designed investment and expense caps. One reason cited for imposition of investment caps is the so-called "race to the top" whereby carriers invest, prudently or otherwise, in order to seek additional HCLS from a capped fund. Because of the reasons cited above, NRIC does not believe that a disallowance of previous, legally made investment should occur, as would result from imposition of the Commission's proposed regression caps.

NRIC maintains that a less draconian way exists to address potentially imprudent investment. Especially in light of the concerns associated with the Commission's regression analysis and the financial impacts on carriers therefrom, NRIC again recommends that the Commission consider classifying existing booked investments into two categories: "reasonable" and "extraordinary." Support would be provided based on recognition of all existing booked costs but at differing return levels. "Reasonable" levels of investment would be those that the regression analysis confirms are at or below the regression limit based on a ROR ETC's operating and geographic attributes, whereas the portion of booked investment above the regression investment limit would be considered "extraordinary." Federal USF recovery would be allowed at the currently authorized return on capital for "reasonable" levels of investment. Recovery for "extraordinary" capital expenditures would be based on a lower overall return using the current authorized weighted cost of debt that is sufficient to recover existing indebtedness.[115]

[115] At the time the Commission last evaluated returns, the prevailing debt interest rate was 8.8%. Assuming a debt ratio of 55.8%, the weighted cost of debt was calculated to be 3.89%. *See generally, Represcribing the Authorized Rate of Return for Interstate Services of Local Exchange*

NRIC respectfully submits that this dichotomy—reasonable investment and extraordinary investment—offers a fair balance between the interests of regulators and ROR ETCs. On one hand, since the Commission has not established any previous investment limits, the use of these classifications provide carriers with an opportunity to service debt on all incurred investments, even if those investment will now be defined for the first time as "extraordinary." Without this recovery, some carriers may not be able to meet their financial commitments and could even face bankruptcy. On the other hand, this proposal eliminates equity recovery on existing investments that the regression analysis would label as "extraordinary." This proposal allows the Commission to target limited USF towards carriers that will make investment choices based on the decisions and mechanisms arising from this proceeding, without penalizing carriers that based their investment decisions on the system of regulation in place before any reform.

C. Eleven Separate Caps Will Not Encourage Efficiency and May Create Unintended Consequences.

The *FNPRM* proposed caps for each of the 11 affected inputs to the NECA HCLS algorithm.[116] NRIC recommends adopting only two caps, one for investment, and the second for expenses. NRIC also recommends abandoning any cap on depreciation expense. No policy reason exists for capping individual components of the HCLS algorithm. By creating so many caps, the Commission is specifying how carriers should deliver services and thus is regulating production technology. Economic theory indicates that such rigorous regulation does not promote economic efficiency or innovation. Indeed, capping so many accounts will neither ensure sufficient universal payments nor promote efficient operations.

Carriers, Order, CC Docket No. 89-624, 5 FCC Rcd 7505, (1990).

[116] *FNPRM,* Appendix H, at para. 13.

Ultimately, the Commission's overall goal should be to encourage efficiency and creativity. Even if such a carrier is more efficient than others are, it could be penalized under mechanism of multiple caps—particularly the poor fitting caps proposed in the *FNPRM*. For example, a carrier might be slightly over a cap in one of the cost categories while its overall cost is below that of similar carriers. If a ROR ETC can decrease overall costs by deploying fiber and thereby eliminating costly maintenance of old copper cable, even though cable investment may increase, then the cable should replaced. Similarly, if a ROR ETC can greatly decrease Cable and Wire Facilities Cost by slightly increasing Central Office costs, that too should be encouraged. However, if 11 separate caps were adopted, the Commission would be intruding unnecessarily into the management of carriers, which may not result in lower costs. This degree of regulatory intervention could have unforeseen and undesirable consequences because it encourages carriers to manage the cost accounting systems, rather than managing their companies efficiently.

Consider first the investment caps. Suppose a carrier has existing Cable and Wire Facilities Category 1.3 investment at the capped level. Suppose also that the carrier wants to consolidate two existing exchanges under the control of a single new soft switch. Making this technology change would require characterizing some interoffice Cable and Wire investment as Cable and Wire Facilities Category 1.3 investment, thereby further violating the AS1 investment cap. However, suppose also that the carrier's COE Category 4.13 investment is not near the AS2 cap. If the AS1 and AS2 caps were combined, the carrier could make the upgrade to a soft switch, increase efficiency, and avoid exceeding the combined cap.

In general, if a carrier has a slightly high cable and wire facilities loop investment and a very low circuit equipment investment, there may be no need to cap that carrier's investment at

all. Only when the *overall loop investment per unit* becomes large might a cap be warranted. An overall total loop investment per unit cap would provide a carrier with the flexibility to decide how best to deploy advanced loop capabilities in a phased process, knowing what total dollars are appropriate, while at the same time continuing to meet its overall ETC service obligations. Establishing so many separate caps could easily produce insufficient support for a carrier that is making rational, cautious investment decisions while providing unnecessary support to a carrier that knows how to game the system.

The redistribution rule in paragraph 220 of the *Report and Order* raises the stakes considerably. A carrier that for the first time becomes subject to one of the 11 categories of caps apparently will suffer a substantial reduction of support, even if it is well under the caps of the other ten categories and has a lower cost per loop than similarly situated ROR ETCs. Having 11 separate caps greatly increases the risk that a currently uncapped carrier might inadvertently fall off that particular "financial cliff."

For these reasons, NRIC respectfully submits that it is a far better and appropriate policy objective to establish a single cap on excessive total loop investment than to try to limit the various components of that loop investment by whether it is cable and wire or circuit equipment or whether it is investment or "materials." Specifically, NRIC recommends that four of the proposed caps be consolidated into a single "investment cap."[117]

The same results outlined above regarding investment caps under the Commission's proposal also apply to the expense caps. The *FNPRM* proposes seven caps on expenses. As was true for investment, there is no policy reason for using so many separate caps. NRIC cannot imagine why, for example, the Commission should be concerned that a ROR

[117] Those categories would include the following: AS1 (C&WF Cat. 1.3), AS2 (COE Cat 4.13), AS7 (C&WF Cat. 1.3 Materials & Supplies), and AS8 (COE Cat 4.13 Materials and Supplies).

ETC reports higher Maintenance Expense on its circuit equipment (Line AS14 in the HCLS algorithm). The capped category is not even that meaningful since AS14 is not the ROR ETC's total Maintenance Expense, but merely a portion of that expense allocated by investment. NRIC sees no reason to cap this specific category of expense, so long as a carrier's total expenses are reasonable.

Moreover, seven separate expense caps are unlikely to be as effective in promoting efficient operations as a single cap. If a carrier's expense level is approaching a cap, (for example, the Network *Support* Expense Line AS15 in the HCLS algorithm) but no other caps, that carrier will have no incentive to be more cautious, for instance, in its spending on Network *Operations* Expense (AS16). However, under a combined expense cap, all carriers will have an incentive to limit overall expenses. The Commission should avoid even the appearance of imposing more caps than that which may be justified by public policy, and which would encourage carriers to shift costs from one category to another.

Accordingly, NRIC respectfully recommends consolidating the five following expense caps into a single cap, along with Corporate Operations, which will be discussed in Section V.D: AS13 and AS14 (maintenance); AS15 (Network and General Support Expense); AS16 (Network Operations Expense); and AS21 (Benefits other than Corporate Operations).

One overall cap for capital investment and another for operating expense (including corporate operations) would better allow carriers to manage to the bottom line, providing quality service for the least cost, using innovative designs and technologies, while not exceeding overall limits that are based on the performance of their peers.

Consolidating the 11 caps into two caps will also improve the reliability of the associated regression studies. The more broadly defined cost categories will likely cancel out irregularities

among ROR ETCs arising from minor peculiarities in plant design or in the coding of expenses. NRIC evaluated this question using the Commission's data. NRIC found that consolidated regression studies achieved a higher R-squared result than separate studies. The equation estimating investment using Commission's data resulted in an R-squared of 0.81, and the model predicting expense achieved an R-squared of 0.75. After corporate operating expense was added to the expense model, the R-squared further improved to 0.77. Despite these relatively well fitting models, NRIC does not support using its regression models because of the underlying data issues with service area boundaries and the lack of other geographic data. Finally, NRIC suggests eliminating the depreciation expense caps, AS17 and AS18. Since depreciation rates are regulated, and investment itself is capped, there is no need to cap depreciation expense.

D. HCLS Expense Caps Should be Applied Consistently, and Not Arbitrarily as Has Been Done with Separate Caps for Corporate Operations and Other Expenses.

The Commission's new method of controlling expenses used in the HCLS calculation is fundamentally different from the existing corporate operations cap. The Commission has made minor adjustments to the corporate operations cap in its final rule,[118] changing only the numerical parameters of that cap.[119] The nonsensical result is two distinct methodologies for capping operating expenses—one for corporate operations and another for all other expenses. NRIC respectfully requests that in order to achieve fairness and encourage efficiency, together with statutorily-required predictability and sufficiency in support for ROR ETCs, the Commission should adopt a consistent approach for all expenses.

[118] *FNPRM,* Appendix A, § 36.621(a)(4)(iii).

[119] *See*, *Report and Order* at para. 227 et.seq. and Appendix C.

1. The Policy Basis Is Obscured by the Two Vastly Different Methodologies for Capping Expenses.

The following table illustrates the major differences between the Commission-established caps for corporate operations expenses and all other expense caps:

	Corporate Operations Cap (Appendix C)	**11-Part Caps (Appendix H)**
Regression method	Least squares	Quantile
Input factors affecting company's cap ($/mo/loop)	Loops[120]	Loops, housing units, land area, percent water, census blocks
R-squared values	Unknown	0.27 to 0.59
Shape of input-output curve	Hyperbolic, linear, or flat in different areas[121]	Exponential (due to log-log regressions)
Threshold for excluding expenses	115% of mean[122]	90th percentile
Use of capped funds	To all supported carriers through lowering of NACPL	To only uncapped carriers

NRIC respectfully submits that these two methodologies are so fundamentally different that the policy basis for establishing expense caps is obscured. The table illustrates the following host of issues, each of which is unexplained:

[120] *Id.* at para. 232.

[121] *Id.* For some small study areas, loops have a linear relation to the cap; for other study areas, the relationship is hyperbolic. For mid-sized study areas, loops have a hyperbolic relation to the cap. For large study areas, the cap is a flat dollar amount per loop per month, and does not vary with size.

[122] *Id.*, Appendix C, at para. 6.

- The Commission found that QR is superior to OLS and is "an appropriate technique to use in setting benchmarks on reimbursable investment and expenses."[123] If so, why then does the corporate operations cap use OLS analysis?
- If 11 independent variables are needed to make reliable predictions of maintenance expense, network support expense and network operations expense, why is only one needed for corporate operations expense?
- The R-squared values of the new 11-cap system are poor, but no R-squared is even mentioned for the corporate operations cap predictor. How reliable is the one-factor regression at predicting actual corporate operations?
- Nearly all the new caps are expressed as exponential cost functions,[124] whereas the corporate operations cap is a mixture of two hyperbolic and three linear functions. No explanation has been given for this fundamental mathematical difference.
- The corporate operations cap appears to apply to many more ROR ETCs than the 11-part caps. The latter is expected to affect 10% of ROR ETCs in the top decile of spending. The corporate operations cap is set at 115% of mean spending, without regard to how many ROR ETCs may be affected. No explanation has been given for this fundamentally different approach.

[123] *FNPRM* at para. 1082.

[124] As discussed above, the general form is Cost = k * X^y where X is the independent variable and y is the regression coefficient.

Another problem arises from the lack of definition inherent in the USOA accounting system. ROR ETCs differ in some of their expense coding practices. Separate caps on different categories of expense can create some perverse incentives. A carrier that is subject to the corporate operations cap, for example, but not a cap on Network Support Expenses, might nonetheless code an ambiguous expense in the latter category. A simplified system with a single cap on operating expenses would avoid creating an incentive for such gaming behavior.

NRIC urges the Commission to eliminate the creation of two fundamentally different capping systems for ROR ETCs. While the corporate operations cap is a final rule, the Commission should reverse that decision and achieve consistency in the evaluation of all investment and expense determinations.

As between the two methods, NRIC suggests that the Commission use OLS similar to the approach submitted by the NRIC is its previous filings[125] that used a variety of independent variables including a density factor for all expenses and investments. This new methodology has the advantage of considering more data to predict reasonable spending levels. Once the logarithm and geographic data questions have been resolved, adopting the multi-input regression methodology also has the advantage of being relatively simple mathematically, compared to the complex corporate operations cap that includes the complex "knot and spline" method to join linear and hyperbolic line segments. Of greatest importance, the new methodology explicitly calculates and reports the success (currently limited) of the regression equation at predicting costs. This information can also help the public evaluate whether the cap is properly responding to curtail unnecessary costs or inappropriately denying sufficient support for reasonable and necessary carrier costs.

[125] *See, Capex Study* and *Opex Study.*

2. Application of the Expense Limits to ICLS Should Be Postponed Until the Two Approaches Can Be Reconciled and Methodological Errors Corrected, and Ultimately One Cap Should Be Applied to All Expenses.

The *FNPRM* seeks comment on how to implement additional cost caps for ICLS. The *Report and Order* has extended the limit on recovery of corporate expenses to ICLS effective January 1, 2012.[126] NRIC strongly recommends that the Commission remedy this by ultimately applying any additional caps it may order for ICLS to all of a ROR ETC's expenses, not establishing separate methodologies for corporate expenses and all other expenses. NRIC calculated the expense caps with corporate operations included, and found that doing so achieves a higher R-squared and thus more robust result.

However, application of additional ICLS caps under a regression model should not occur until the proper regression analysis is in place. As demonstrated above, the necessary confidence in the Commission's underlying regression studies does not exist today. Accordingly, NRIC respectfully suggests that the Commission should postpone consideration of this issue until it has broadened the sources of independent variables it uses, solved the mathematical issues surrounding the use of logarithms, simplified the number of caps imposed, and generally improved the reliability of the regressions. Each of these improvements is needed to advance the universal service objectives contained within the Act.

[126] *Report and Order* at para. 196.

VI. THE ANNUAL CAPPING AND REDISTRIBUTION OF HIGH-COST LOOP SUPPORT WILL CAUSE FEDERAL PAYMENTS TO BECOME INSUFFICIENT AND UNPREDICTABLE.

In the *FNPRM*, the Commission seeks a mechanism to limit HCLS to ROR ETCs whose costs are significantly higher than other ROR ETCs that are similarly situated.[127] In an effort to accomplish this objective, the Commission proposes a system in which investment and expense caps are calculated annually for ROR ETCs.[128] The new cap would first apply in July, 2012.[129] NRIC has identified numerous issues of concern with the mechanics of the capping and redistributions mechanisms as outlined below that require Commission action.

A. Annual Recalculation of Caps Is Likely to Produce Insufficient and Unpredictable Support.

In an effort to accomplish the objective of limiting HCLS to carriers with significantly higher costs, the Commission proposes a system in which investment and expense caps are calculated annually for ROR ETCs.[130] NRIC respectfully submits that this annual recalculation feature creates two problems for supported carriers.

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[127] *Id.* at para. 220.

[128] *Id.* at paras. 214 and 218. The Commission did delegate authority to the Bureau to adopt the initial methodology, to update it as it gains more experience and additional information, and to update its regression analysis annually with new cost data. *Id.* at para. 217. However, it is unclear whether the annual recalculation requirement is subject to Bureau modification.

[129] *Id.* at para. 216.

[130] *Id.* at paras. 214 and 218

1. The Repeated Application of Caps Set at the 90th Percentile Will Lead to a "Destructive Spiral" of Cost Constraint.

The first concern arises from a possible feedback loop in which the caps affect carrier spending, and carrier spending in turn affects the stringency of future caps. As roughly 10% of ROR ETCs will have their costs capped in the first year (or 2% or 5% if NRIC's earlier recommendation is adopted), these carriers will likely reduce their spending. This behavior will eventually change the input variables measured by the Commission, which in turn will affect the future 90th percentile spending level and therefore reduce the threshold for the cap. This feedback cycle can occur repeatedly as carriers adjust their spending over time. In short, there is a substantial risk that the caps will become more demanding over time, demanding ever lower levels of spending. At some point, carriers will simply no longer remain viable.

NRIC is concerned that this annual recalculation feature, with a negative feedback mechanism, creates a risk of a destructive spiral in which support becomes progressively less sufficient (and progressively less predictable as well) over time to achieve universal service goals and requires ever more ROR ETCs to seek the waivers authorized by the *Report and Order*.[131] Such a destructive spiral is, in NRIC's view, unnecessary, improper and inconsistent with the sufficiency requirements of Section 254.

2. Annual Recalculation of Caps Will Create Unpredictable USF Disbursements.

The annual cap updates create another universal service problem as well. ROR ETCs anticipating major capital investments typically incur long-term debt. To pay the debt service, a carrier necessarily seeks as much certainty as possible with respect to future revenue streams in

[131] *Id.* at para. 222.

order to meet loan payback obligations. However, future caps proposed in the *FNPRM* will depend on the industry's response to the new cost constraints. Even highly trained and informed analysts will find it difficult to predict collective carriers' behavior, and therefore will not be able to accurately predict the level of future investment and expense caps. By recalculating caps annually, the Commission is violating the predictable support principle of Section 254, which will further inhibit ROR ETCs from investing in costly broadband facilities.

Instead of annual recalculation, therefore, NRIC respectfully suggests that the Commission should establish a base cap once the problems with its regression equations are resolved. The base cap should not be reset until the next Census data is available, unless it concludes in the meantime that the regressions have improved materially or a major technological advance should change allowable spending levels substantially. Of course, it is reasonable to adjust the base cap for inflation annually.

B. Capped Support Should Be Redistributed to Other ROR ETCs Receiving HCLS But If the Commission Establishes More Than One Cap for Expenses and One Cap for Investment, Support Should Be Redistributed No Matter Whether a ROR ETC Was Capped by One of the Many Caps.

NRIC has serious concerns about the implications arising from the application of the caps vis-à-vis the redistribution rule proposed in paragraph 220 of the *Report and Order.* In paragraph 220, the Commission states that when carriers lose universal service support due to the new caps, the amount of support lost will be "redistributed to those carriers whose unseparated loop cost is not limited by operation of the benchmark methodology."[132] As implemented in the published estimates of the application of Appendix H, however, the amount of support lost by

[132] *Id.* at para. 220.

capped carriers is not redistributed to the other carriers, uncapped or otherwise,[133] and thus the impact of the directives of paragraph 220 cannot be estimated nor can the mechanics of such redistribution be tested.

1. The Commission Should Clarify its Intent Regarding the Redistribution of Capped Support.

Paragraphs 220 and 1084 of the Order and FNPRM leave critical questions unanswered as to how the redistribution of capped funds will be implemented. NRIC recommends that the Commission clarify the following points:

(1) The total amount of HCLS distributed with the caps should be the same as the total amount of HCLS that would have been distributed without the caps. This result appears to conflict with paragraph 1084.

(2) If the Commission plans to develop a pool of funds for redistribution due to application of the new caps, both capped and uncapped carriers should be eligible for those funds under the existing HCL mechanisms. In other words, when the National Average Cost Per Loop ("NACPL") is lowered as a result of implementing the caps, both capped and uncapped carriers should be eligible for redistribution of support. This result apparently conflicts with the language in paragraph 220.

(3) If the Commission draws a distinction between capped and uncapped carriers for purposes of redistributing funding, average schedule ROR ETCs should be considered uncapped, by definition. There is no reason to apply caps to costs that are determined by a Commission-approved formula.

[133] *See, FNPRM* at para. 1084 and published online data from the Commission.

NRIC respectfully submits that the Commission clarify its intent behind the "redistribution" statements of paragraph 220 and re-issue the tentative results of the proposed regression analysis. Absent such effort, the redistribution provision creates the real potential for needless administrative complexity and greatly increases the tendency of the caps to inhibit needed investment for broadband deployment, let alone meaningful opportunity for interested parties to comment on the mechanics associated with it. NRIC respectfully submits that implementing the "redistribution" requirement in paragraph 220 will greatly complicate the process of estimating support in the future, increasing the number of variables that can affect a carrier's own support, and making support even less predictable, in violation of Section 254. The effect will be to constrain further investment in broadband facilities.

2. The New Mechanism Creates Large Differences in Support Based on Small Differences in Circumstances.

The uncertainty of the redistribution language in paragraph 220 also creates a second issue. Under the *Report and Order*, any ROR ETC subject to one or more of the 11 caps would be placed in a separate group of ROR ETCs that paragraph 220 declares ineligible for "redistributed" HCL support.[134] The *Report and Order* thus draws a distinction between capped and uncapped carriers.

A carrier can move from the uncapped to the capped group by a minor accounting shift, but the financial effect is large. For a carriers moving from the uncapped to the capped group, support would decline by at least $2.76 per line per month,[135] plus whatever effect the cap might

[134] *Report and Order* para. 220. "Redistributed support" is the financial support that would otherwise flow to a supported carrier because the new caps would tend to reduce eligible cost and thereby reduce National Average Cost per Loop.

[135] NECA filed the national average cost per loop before implementing caps at $505.97 per line per

have on that individual ROR ETC.[136] A ROR ETC would become subject to this substantial penalty even if it exceeds by $0.01 only one of the 11 kinds of capped investment or expense discussed in the *FNPRM*. This incentive structure creates the earlier described "cliff" that rational carriers will seek to avoid. Because the financial consequences are large, any ROR ETC not currently subject to a cap would rationally seek to avoid becoming subject to any of the 11 caps.

Seeking to avoid the financial "cliff" and the caps generally will have costs. The Commission has not explained whether it will routinely provide carriers with complete information about their proximity to each cap. Therefore, without assistance from a statistician, ROR ETCs will not know how much "headroom" is available under the caps.[137] This uncertainty is not only likely to impair investment, but to add expense as ROR ETCs retain statisticians to avoid inadvertently suffering financial losses as a result of investing in advanced facilities.

The caps depend on industry spending patterns. Thus, when caps are recalculated in the future, they may move unpredictably in response to the behavior of other carriers. Therefore, any carrier's future cap in any of the 11 cost categories would be determined not only by its own

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year. The commission estimated the post-cap NACPL at $455. *FNPRM* at n. 2210. The difference is $51 per line per year. The typical ROR ILEC receives support at the rate of 65% of the gap between its costs and the NACPL. Therefore the typical ROR ILEC would receive (HCLS at 65% of the cost gap) is $33.15 per line per year, about $2.76 per line per month. Extremely high-cost companies receive support at 75% on marginal cost differences, and their losses would be greater.

[136] The final figure could be larger. The Commission's published data suggest that it did not actually redistribute the support taken from capped carriers. If that support were redistributed to uncapped carriers, the NACPL presumably would fall below the Commission's published estimate of $455. In that case, the consequences of falling off the financial cliff would be even graver.

[137] If QR is ultimately used for the caps, then the Commission should provide ROR ETCs with a simple means to determine their proximity to each cap.

line counts and by Census data, but also by the spending actions of other carriers. Even a carrier that imposes a freeze on spending cannot be assured that it will not become subject to a cap and, if it is not currently subject to a cap, someday fall off the financial cliff.

Accordingly, the method by which the Commission has proposed to implement paragraph 220—that is, through 11 separate caps in the proposed regression analysis—creates untenable, unpredictable results that are contrary to the Commission's stated objectives of broadband deployment. The proposed method to implement paragraph 220 creates a substantial financial penalty, and the risk of hitting one or more of any future year's caps can occur in any number of ways in response to changes made by the Bureau to the regression methodologies, to changes to Census data, and even to future spending decisions by other carriers. NRIC respectfully submits that this system is not predictable and therefore violates Section 254.

The Commission can avoid at least some of these problems by eliminating the directive to "redistribute" funds only to uncapped carriers based on the complexity and unpredictability caused by such a directive. By eliminating the directive, the existing mechanism will run more smoothly, only one run will be needed, and the caps will have their intended effect. In the proposed run, the Study Area Cost per Line will be calculated using the regression equations caps. NECA would then calculate the NACPL that constrains total support to HCL fund cap for that year. Every carrier receiving support will benefit when one carrier's costs are curtailed by the cap. NRIC sees nothing improper in this result.

PART II – DISCUSSION OF OTHER POLICY ISSUES

VII. FIVE GUIDING PRINCIPLES WILL ADVANCE THE PUBLIC INTEREST WITH RESPECT TO CONSIDERATIONS FOR ADDRESSING "REMOTE AREAS" WITHIN A ROR ETC SERVICE AREA.

In Part K of the *FNPRM* the Commission seeks comment generally on the best method to support remote areas where the cost of deploying traditional terrestrial broadband networks is extremely high.[138] Although NRIC recognizes that the Commission has not defined the remote areas in connection with ROR ETCs,[139] NRIC nonetheless respectfully submits that five overarching policies should be enunciated now in order to help ensure that policies regarding ROR ETC "remote areas" properly reflect the commitments to and deployment of broadband networks that have factually been demonstrated by ROR ETCs as compared to other ILECs.

The facts presented to the Commission in this proceeding demonstrate an overwhelming commitment by ROR ETCs to provide ubiquitous broadband throughout the entirety of the ROR ETC service areas. This commitment and success in broadband deployment far outpaces deployment by the larger ILECs not subject to ROR regulation. Nevertheless, NRIC understands that even in ROR ETC service areas there may be geographic areas within which the rational deployment of broadband capability may raise new and different challenges than those presented in other areas of that ROR ETC's service area. Accordingly, as a general matter, NRIC respectfully submits that policies regarding remote areas tailored to the ROR ETC service areas are appropriate and rational and should be built upon the successes that have been achieved to

[138] *Id.* at para. 1223.

[139] *See, Report and Order* at para. 533, n. 893.

date. Accordingly, NRIC provides the following parameters that should govern the consideration of specific policies related to "remote areas" served by rural ROR ETC.

First, the Commission should improve its mapping efforts regarding the identification of rural ROR ETC remote areas. While the Commission suggests the long-term use of a forward-looking model that, once finalized, will be used to identify remote areas,[140] in the interim, the Commission proposes to identify Remote Areas as census blocks in which there is no existing wireline or terrestrial wireless broadband service currently available.[141] NRIC has analyzed the maps used by the Commission for various purposes based on our detailed knowledge of Nebraska and, as discussed in Section IV.B.3 above and in pages 37-38 of NRIC's comments in response to the Commission's April 21, 2010 Notice of Inquiry and Notice of Proposed Rulemaking (FCC 10-58) and on the "ABC Plan" in August, 2011., NRIC has identified serious flaws in the maps thus far proposed by the Commission.[142] Those flaws include not only appropriately identifying the areas served by ROR ETCs but also in identifying whether and to what extent broadband service is available in those areas. NRIC respectfully submits that any proposal based on the current mapping of remote areas and thereby identifying areas where broadband service is not available are deeply flawed, particularly if such proposals do not involve consultation with state commissions.

With respect to coordination with the state commissions in particular, NRIC respectfully submits that it would be irrational for the Commission to avoid consultation with state

[140] *Id.* at para. 1229.

[141] *Id.* at para. 1230.

[142] *See*, Comments of the Nebraska Rural Independent Companies, WC Docket No. 10-90, GN Docket No. 09-51, WC Docket No. 05-337 (April 21, 2010 NOI and NPRM Comments), filed July 12, 2010 at 37-38; Comments of the Nebraska Rural Independent Companies, WC Docket No. 10-90 *et al*. (ABC Plan Comments) , filed August 24, 2011 at 52-53.

commissions on the proper definition of any remote area, if for no other reason than it is the state commission that can validate any mapping of remote areas based on real world facts and real world understandings of the certification boundaries that have been created within such state. In addition, this coordination is fully consistent with the Commission's statements that it respects the dual sharing of responsibility for universal service with its state commission counterparts,[143] as well as the fact that it is primarily state commissions that designate ETCs and therefore, are familiar with the service areas and service commitments within their respective states.

Further, such consultation and coordination is rational because many states currently impose carrier of last resort ("COLR") obligations on wireline carriers. Likewise, since approximately one-half of the states have implemented state Universal Service Funds ("SUSFs"), it is only reasonable and prudent that the Commission coordinate consideration of its actions so as to allow both the Commission and the states with SUSFs to understand the impact of remote area designations on the SUSFs and on existing COLR obligations.

Accordingly, for all of these reasons, rational and prudent public policy supports the notion that the Commission should formally consult with state commissions to evaluate whether the state commissions consider designation of specific remote areas to be in the public interest. Through this consultation, the Commission and its state commission partners can make the necessary determination with the full range of facts and policies at issue.

Second, any identification of remote areas must accommodate the fact that voice still remains an integral component of universal service.[144] NRIC is properly concerned that a reading of Section K of the *FNPRM* may suggest that the voice aspect of the Public Switched

[143] *See, e.g., Report and Order* at paras. 75, 109.

[144] *FNPRM* at para. 1239.

Telephone Network ("PSTN") is not relevant to defining policies applicable to "remote areas" for purposes of broadband deployment. Such inferences, however, are wholly improper. The existence of landline voice networks should *not* be ignored if those networks are not currently providing broadband at speeds that are required to meet CAF-required speeds.

To be sure, both the Commission's rules and Section 254(b) of the Act amply support the notion that voice service is an integral component of long-standing and prospective universal service policy. Moreover, it is only local voice service that has been designated as a component of universal service. Absent explicit acknowledgment of these facts, remote area CAF funding focused solely on broadband could lead to the very untenable situation that the Commission de-funds the only existing provider that could otherwise meet the Commission's voice telephony service requirements – the ROR ETC.

Thus, NRIC respectfully submits that the Commission should not consider an area to be a "remote area" if there is an existing rural ROR ETC in operation that can, with a rational addition to its current budget, upgrade its network in a reasonable amount of time to meet the broadband universal service obligations and standard required by the Commission. This would preserve voice service and provide these customers with the opportunity to receive broadband services that are scalable and have the potential to be comparable to service provided to other Americans. In evaluating those instances in which an existing ROR ETC not meeting the broadband requirements should be permitted to upgrade its network, the Commission should at the very least assess: (a) the likely short-term and long-term effects on existing services; and (b) the likely short-term and long-term effects on state and federal universal service funds.

Third, any remote area that requires an ETC to be designated (as compared to an existing ROR ETC upgrading its network) must be done in compliance with Section 214(e) and Section

254(e).[145] Only entities meeting the requirements of Section 214(e) should be eligible to receive disbursements for remote areas and, as a general matter, that designation is a state commission function.[146] Not only is this sound policy, but it is the only choice consistent with the requirements of the Act.[147]

At the same time, NRIC recognizes that complications may arise with respect to Tribal Authorities or the situation where a satellite provider may seek ETC status. In the former situation, the *FNPRM* asks whether ETC designation should remain a state function in non-Tribal areas.[148] Once again, the Act does not afford the Commission discretion in this area. States have a statutory right, if they choose, to designate all ETCs in their states that are "subject to state commission jurisdiction."[149] Even if a "satellite provider" could demonstrate ETC eligibility and then have that status granted to it, NRIC understands that questions of state jurisdiction over satellite services could be raised. Therefore, where there has been a clear legal demonstration that a state commission has no jurisdiction over a satellite provider seeking ETC designation, the Commission may find the need to be the designating entity for satellite service providers that seek ETC status in order to be statutorily eligible to receive funding for a broadband universal service offering. However, that type of designation should, consistent with the federal-state partnership on universal service, be coordinated with the affected state commissions. Consequently, only in exceptional cases would there be a need for the

[145] *See,* 47 U.S.C. §214(e) and §254(e).

[146] *FNPRM* at para. 1234.

[147] 47 U.S.C. § 254(e).

[148] *FNPRM* at para. 1235.

[149] 47 U.S.C. § 214(e)(2), (e)(6).

Commission to presuppose that it will need to assume greater authority over the designations of ETCs, and even in those circumstances the Act provides the framework under which the Commission must proceed.

Fourth, the Commission should ensure, along with the relevant state commission, that any ETC serving a remote area should have readily identifiable public interest obligations. In a manner consistent with the *FNPRM*, NRIC supports the proposal that an ETC in a remote area must offer voice service throughout its supported area as a standalone service, and must offer it at rates reasonably comparable to urban areas.[150] So too, NRIC supports the uniform application of any broadband speed requirements to all ETCs regardless of whether that ETC is operating in a remote area or not, and thus cautions against adopting any proposal that would "modestly relax" broadband requirements on supported carriers.[151] NRIC submits that this speed requirement is a mandatory standard for any ETC providing broadband service in Remote Areas as it avoids broadband "haves and have nots" with respect to speed. Further, the speed requirement also avoids the very digital divide that was the policy rationale for changes made in the USF by the Commission. By not uniformly applying broadband speeds across the country required for universal service funding, the Commission will be creating a new rural/rural divide and a million Americans or more will be left behind.

Finally, the Commission should not consider consumer subsidies in remote areas[152] as a substitute to providing CAF dollars to the actual facilities-based ETC operating in the area. CAF monies are best used to deploy broadband networks; consumer subsidies do not build networks.

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[150] *FNPRM* at para. 1239.

[151] *Id.* at paras. 1240, 1241.

[152] *Id.* at para. 1255.

If consumer subsidies are required to allow lower-income consumers to have access to broadband, NRIC respectfully submits that those issues should be discussed and resolved within and under the current Lifeline programs and funded with new monies not those currently within the "budget" for ETC disbursements.

VIII. MIDDLE MILE TRANSPORT COSTS SHOULD BE RECOVERABLE FROM THE CAF SINCE THEY ARE AN INTEGRAL COMPONENT OF THE SERVICE FOR WHICH A ROR ETC IS NOW RESPONSIBLE.

In the *FNPRM* the Commission seeks comment on the Rural Association Plan's proposal to include middle mile costs in ROR ETCs' CAF recovery. Specifically, the Commission sought comment "…on the benefits and the costs of providing support for 'middle mile' facilities and access to the Internet backbone …[and,] [o]n average for small carriers, approximately what proportion of the costs to deploy broadband networks and provide broadband services are attributable to middle mile and Internet backbone costs today?"[153] The only sustainable method for the Commission to achieve the performance and pricing goals of rural broadband for the customers of ROR ETCs is to assure that the costs required to achieve a 4:1 standard from the customer location to the public internet are recoverable. This includes middle mile transport costs. To do otherwise creates a mismatch between the performance requirements of broadband and the underlying costs. In addition, these costs should, for the foreseeable future, be measured during periods of peak usage and the related costs must be recovered from the CAF. The actual costs incurred are the appropriate standard in that there is no evidence of inflated statements of these costs.

[153] *Id.* at para. 1035.

For most of the companies that comprise NRIC, middle mile transport is provided not only by the ROR ETC itself but also by large communications providers that control large portions of the network both in terms of geography as well as the variety of facilities and services provided. A major reason for this is because the transport distances required by a provider in rural areas like those in Nebraska are far greater than those required in urban areas, thereby making a self-provisioning solution impractical and uneconomic.

Nonetheless, NRIC has experienced first-hand the fact that large, third-party transport providers exert considerable market power over facilities that ROR ETCs must purchase. This reality does not alter the fact that middle mile transport costs are a necessary and legitimate cost of providing broadband service that meets the performance standards established by the Commission.[154] Therefore, to the extent that the Commission has concerns about third-party transport costs, the Commission should complete its analysis of the special access market in its on-going proceeding. Pending that resolution, however, the middle mile transport costs incurred by a ROR ETC must be recoverable to avoid any mismatch between universal service requirements and cost recovery, recognizing that the future recovery levels for third party middle mile transport costs may be reduced based on the Commission's special access investigation.

Without broadband access and broadband transport being aligned, the objectives of broadband connectivity in rural America will not be met. Thus, CAF recovery for these costs by ROR ETCs is entirely appropriate and necessary.

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[154] *See generally, Special Access Rates for Price Cap Local Exchange Carriers, WC Docket No. 05-25, AT&T Corp. Petition for Rulemaking to Reform Regulations of Incumbent Local Exchange Carrier Rates for Interstate Special Access Services*, RM-10593, Order and Notice of Proposed Rulemaking, 20 FCC Rcd 1994 (2005) (the "*Special Access NPRM*").

A. A Proper Definition and Measurement of Middle Mile Transport Costs is Required.

Consistent with the Commission's efforts to establish standardized broadband speed measurement and the network configurations,[155] NRIC respectfully submits that "middle mile" transport costs require proper definition. While pictorially the nomenclature used in the *Report and Order*'s Figure 3[156] may be appropriate for showing aspects of the network used to reach the Internet, from an operational and functional perspective the *combination* of the "Broadband Provider Middle Mile Transport" and the "Broadband Provider 2nd Mile Transport" are the middle mile transport costs associated with aggregating and transporting individual broadband connections from the ROR ETC's aggregation point (or "DSLAM", for example) to the public Internet.[157] These middle mile transport components represent a single cost that is incurred to transport traffic to and from the public Internet. Thus, NRIC respectfully requests that the Commission collapse the two "clouds" noted in Figure 3 between the identified points "2" and "4" and establish this aspect of the transport to the Internet as "middle mile transport costs."

Likewise, in order to properly reflect the actual and relevant broadband performance, it is imperative that broadband service be measured during the busy hour or peak load. This is especially crucial for determining the provisioning requirements for middle mile transport. As the applications that traverse not only the loop portion of a broadband service but also as the transport portion evolves, there needs to be adequate bandwidth to accommodate broadband customers at periods of heaviest demand. This is a dynamic process. A recent forecast of IP

[155] *Report and Order* at paras. 111-112.

[156] *Id*. at para. 111.

[157] Points (4) through (1) in Figure 3 are the relevant portions of the middle mile transport requirements. *See id*. at para. 111 (Figure 3).

traffic by Cisco indicates that busy hour IP traffic will increase fivefold between 2010 and 2015 while average IP traffic will increase fourfold for the same period.[158] If middle mile transport facilities are not continually expanded (and the costs to do so are incurred), a 4:1 standard becomes unsustainable and irrelevant regardless of the capabilities of the loop portion of the service.

B. Middle Mile Costs are Necessary for the Provision of Rural Broadband Services and Should be Recoverable Under the CAF.

NRIC respectfully suggests that that the CAF should include the recovery of middle mile transport costs associated with those facilities that a ROR ETC provisions, particularly now that the Commission has defined the responsibility to meet broadband universal service speeds (*i.e.*, the 4 Mbps down/1 Mbps up) from the ROR ETC's network to the portal to the public Internet.[159] In light of these obligations, the ROR ETC's obligation must match the network (and thus cost recovery of that network) that the ROR ETC operates. Having established Figure 3 in the *Report and Order*, therefore, NRIC cannot envision a basis where the Commission would impose a network obligation on a ROR ETC to meet a universal service broadband obligation and then not permit the recovery for the costs associated with fulfilling that obligation.

Accordingly, the only logical conclusion that can be reached is that middle mile transport costs must be included in the CAF funding requirements or there would be a *mismatch* between the obligations to ensure that network arrangements are in place to meet the Commission's

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[158] Cisco Visual Networking Index: Forecast and Methodology, 2010 – 2015, http://www.cisco.com/US/solutions/collateral/ns341/ns525/ns537/ns705/ns827/white paper c11-481360 ns827 Networking Solutions White Paper.html

[159] Points (4) through (1) in Figure 3 are the relevant portions of the middle mile and internet backbone *Report and Order, Figure 3.*

broadband CAF funding requirements and the costs incurred by the ROR ETC to achieve that result. Even without Figure 3, however, rational public policy and the practical requirements for middle mile transport also support this conclusion.

There can be no serious question that middle mile facilities are an integral component of access to the public Internet and, ultimately, are one of the key determinants in ensuring that the Commission's objectives in this proceeding – accelerating broadband deployment to rural areas of the country – are, in fact, met. Scalable facilities required to meet consumers' need for "speed" requires that costs be incurred. These costs, in turn, benefit all users and providers that rely upon the public Internet and thus the middle mile transport costs should be shared among these beneficiaries. Therefore, including the transport costs associated with middle mile facilities is a rational and entirely proper use of CAF funding.

Moreover, even though middle mile transport costs have not been included in any USF/CAF disbursement budget to date, since the focus of the *Report and Order* is on the migration from a voice-centric network to a broadband-centric network, including middle mile transport facility costs in the CAF budget avoids creation of broadband islands with potentially inferior access to the public Internet. Therefore, to exclude these costs would invite the unintended consequence of having broadband access that meets the Commission's speed objectives without the ability to reach the public Internet at the corresponding standard.

As a practical matter broadband access must correspond to middle mile transport capabilities. A consumer with 4:1 broadband access will have the capability to utilize applications and the requisite transport capacity that a consumer with slower Internet access will not possess. Inadequate middle mile transport degrades overall broadband functionality. Sufficient and robust middle mile transport facilities are necessary to support an actual (not

advertised) performance standard and are an integral component of the access to the Internet that the Commission has outlined. Thus, it is only rational that a ROR ETC's middle mile transport costs should be included in the CAF in order to ensure the availability of the very scalable access to the public Internet that the Commission's actions envision will occur in ROR ETCs' portions of rural America.

Accordingly, NRIC respectfully submits that the Commission should allow ROR ETCs to include their middle mile transport costs in the CAF for recovery. As an integral component of the ability to gain access to and expand the use of the public Internet in rural America, the costs associated with providing that opportunity to rural Internet Service Providers ("ISPs") that utilize a ROR ETC's broadband transport network may be above those costs that otherwise recoverable through comparable broadband rates.[160]

C. The Costs for Middle Mile Transport are Significant and will be Increasing as Broadband Demand and Required Speeds Increase.

With respect to the costs associated with middle mile transport, NRIC notes that, for a number of the companies that comprise NRIC, middle mile transport facilities are provided by more than one transport provider and the total cost for these facilities represents a significant portion of their non-regulated ISP's operating costs.[161] Middle mile costs are a function of bandwidth requirements, distance to the Internet backbone access connection point, the

[160] *See, e.g., Report and Order* at para.113-114.

[161] Two of NRIC members, Great Plains Communications, Inc. and the Consolidated Companies (*i.e.*, Consolidated Telephone Company, Consolidated Telco, Inc., Consolidated Telecom, Inc. and The Curtis Telephone Company), have conducted studies of middle mile transport costs incurred by their respective non-regulated Internet Service Provider operating divisions. Middle mile transport costs are 23% and 29% of total broadband costs, respectively.

competitive landscape and availability of alternative middle mile transport providers in any particular market.[162]

Likewise, middle mile transport costs grow as a function of broadband demand. More consumers with increased demands for broadband speed require the underlying provider to acquire more middle mile transport bandwidth. New applications that become available to consumers with higher-speed broadband (*e.g.*, streaming vs. "bursty" applications) require greater middle mile transport bandwidth. These network provisioning realities create increased middle mile transport costs over time.

At the same time, however, NRIC is not aware of any finding that middle mile transport costs in rural areas are, as a function of the higher-cost-to-serve areas of the country, out of step with the level of service needed to ensure comparable rural Internet access availability to that which exists in more densely populated urban areas with reduced transport mileage requirements. Whether it is through the *Special Access NPRM* or as part of the data gathering effort discussed below, NRIC recommends that the Commission begin to collect data on middle mile costs and any policy to limit these costs should be developed only after analyzing that data. Pending such action, however, NRIC respectfully submits that the Commission should refrain from imposing caps on the actually incurred middle mile costs and the recovery of those costs from the CAF until a full analysis is completed.

D. Middle Mile Transport Costs are a New Obligation Under the *Report and Order* and Therefore Should be an Addition to Any Currently Prescribed

[162] As an example, while a metropolitan area such as Omaha, Nebraska may have a number of middle mile providers from which transport arrangements to the public Internet can be obtained, large sections of western Nebraska may have only limited options both in terms of alternative backbone providers and related economical pricing.

CAF "Budget" and Reporting of Middle Mile Transport Costs Should be Required to Ensure Accountability.

At this juncture middle mile transport costs – particularly those costs paid to a third party – are a new cost onset that must be considered outside of any CAF "budget" that the Commission has established. These costs in their entirety have not been included in the costs reported for universal service cost recovery as certain of the costs have been incurred by ISPs. However, in light of the new Commission requirements, recovery of these costs must be provided in order to avoid a mismatch between recovery and service obligations of a CAF recipient. Thus, all middle mile transport costs should be included in a ROR ETC's calculation of broadband costs to be recovered from CAF. Including these middle mile transport costs allows ROR ETCs with the highest costs, whether as a result of high broadband access costs, high middle mile transport costs or a combination of the two, to be funded by CAF while advancing the Commission's goals for broadband deployment in rural America.

NRIC understands that the one of the focuses of the new USF/CAF regime established by the Commission is the effort to ensure continued accountability.[163] To achieve accountability, rational efforts to gather the necessary additional cost data regarding middle mile transport costs should be undertaken along the following lines.

First, in order to properly understand the range of prices and the diversity in provisioning of middle mile transport facilities, NRIC submits that the Commission could undertake an efficient and streamlined data gathering process as part of the submissions of CAF requirements by ROR ETCs. This data gathering could readily capture the following information:

[163] *See, e.g., id*. at paras. 1 and 568.

- Identification of middle mile transport facilities providers;[164]
- Description of bandwidth provided by middle mile/backbone provider;
- Price per unit (distance, bandwidth etc.) by middle mile/transport provider; and
- Number of broadband customers by "speed" category (different categories of broadband consumers utilize different amounts of middle mile/backbone capacity).

However, in no case should a nationwide average middle mile cost per subscriber for all carriers be presumed such as that proposed in the Rural Associations Plan[165] since middle mile transport costs are service-area specific for the reasons discussion in Section VIII.C, above.

Collection and analysis of this information will allow the Commission to gauge the variability in middle mile/transport costs as well as to compute a bandwidth requirement for a given category of broadband consumer. If gathered over time, the data would most likely show an increasing demand for middle mile transport capacity as the broadband consumer base increases and the utilization and nature of broadband applications changes to meet broadband consumer demand.

Second, as an additional measure the Commission should undertake a review of the prices charged by middle mile providers. While this subject is addressed in the Commission's ongoing *Special Access NPRM*, on-going data gathering and analysis of such data would still be appropriate as it may pinpoint areas of the country where middle mile transport facilities are

[164] NRIC recognizes that confidentiality issues associated with the underlying facilities-based provider would need to be established by the Commission to ensure that this type of program realized the data collection that the Commission determines necessary to monitor middle mile transport costs. The mechanics for allowing confidential treatment of such information is nothing new for the Commission. *See, e.g., Report and Order* at para. 921 (Recovery Mechanism compliance data "may be filed under protective order and will be treated as confidential.").

[165] *See* Nebraska Companies August 3rd Reply Comments at 26.

limited where there is a lack of competition for middle mile transport, or where public Internet access points have migrated geographically further from ROR ETCs.

Provisioning of access to the public Internet for the broadband customers of a ROR ETC through middle mile transport facilities purchased from third parties leaves the potential for a "price squeeze" if, for example, special access rates for middle mile transport facilities are allowed to grow unchecked while consumer broadband rates are constrained by competitive and comparability restrictions. Thus, to avoid such a scenario and the chilling effect on broadband deployment and adoption in rural areas that such unchecked special access rates may have, the Commission should include the monitoring of the behavior of the large carriers – like AT&T, CenturyLink and Verizon – in its oversight of middle mile and backbone costs and rates.

IX. ADDITIONAL CERTAINTY WITH THE CAF DISBURSEMENT PROCESS WILL ENHANCE DEPLOYMENT OF BROADBAND IN ROR ETC AREAS.

NRIC provides the following specific comments on discrete aspects of the *FNPRM*. NRIC respectfully submits that action consistent with that recommended herein will inure to the benefit of the commission's overarching goal of deploying broadband in rural areas of this nation, including those that are served by ROR ETCs.

A. CAF Disbursements Should Be Made Available For Broadband-Only Loops.

The Commission has asked a variety of questions with respect to the Rural Associations' proposal regarding broadband take rates, including the Rural Associations' contention that CAF should be provided for lines that support "broadband only" in addition to those lines that support both "voice and broadband."[166] Since the Commission envisions that broadband provision will

[166] *FNPRM* at para.1036.

now be a quid pro quo for receipt of support even though the Commission did not explicitly include broadband in the list of supported services, NRIC respectfully submits that there is no logical or practical reason to exclude broadband-only lines from any CAF disbursement calculations, particularly since applications exist today that allow broadband-only loops to be used for voice services (*e.g.*, Vonage) coupled with the likelihood that broadband only loops are provided based on a customer's choice not to subscribe for the ROR ETC's voice service offering. NRIC respectfully submits that this result logically advances the Commission's policy to migrate toward a broadband centric network. Absent that conclusion, Commission efforts to ensure the further deployment of broadband infrastructure would be thwarted.

The Commission has made clear that the action taken in the *Report and Order* was driven by its public policy desire to deploy broadband throughout the country.[167] This broad public policy announcement cannot and should not be undermined if the line at issue is used only to provide broadband. Rather, if a line provides broadband and can otherwise support voice applications, it is a broadband line and should be subject to the CAF-related treatment afforded all other broadband lines. This conclusion is consistent with common sense, simple logic and the practicalities of consumer choice. Thus, the conclusion advances rational public policy.

Broadband consumers will (and should) drive the choice as to whether to seek the full panoply of voice and broadband capabilities that a ROR ETC has to offer or just its broadband offering. This choice is no different than that which is occurring today as consumers reach decisions relative to voice needs, *e.g.,* substitution of mobile voice service for wireline voice service or the use of a voice application over broadband connection (such as Vonage or other "over the top" voice service providers).

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[167] *See, e.g., Report and Order* at paras. 3-5.

Where voice is nonetheless capable of being provided by the ROR ETC over the same line, but the choice of the consumer is to subscribe to only the ROR ETC's broadband capability, there should be no exclusion of the costs of that line in the ROR ETC's CAF disbursement calculation. Rather, including this line in the ROR ETC's CAF disbursement calculation (when the line could otherwise provide voice service but for the customer's choice) is the proper result and is fully consistent with the Commission's desire to encourage broadband usage and deployment.

NRIC is not now in a position to discuss the method by which the recovery from the CAF for broadband-only lines should be established. However, once an overarching determination with respect to the standards by which that recovery should be accomplished is made, any recovery for a broadband-only line must be consistent with the reasonably comparable requirements of Section 254 of the Act.

NRIC anticipates that broadband-only services offered by the larger wireline carriers in urban areas may ultimately drive the demand for comparable broadband-only services in more rural areas. Thus, to the extent that standalone broadband is required in high-cost rural markets it should be supported if the cost of providing the service exceeds the comparable price in urban areas.

B. To The Extent Available, Savings In Budgeted CAF Support Should Be Made Available To The ROR Programs Including The CAF And Other Universal Service Mechanisms Established For ROR ETCs.

The Commission asks whether if "savings are realized in other components of the CAF . . . should those savings be used to increase funding for rate-of-return carriers. . . ."[168] NRIC

[168] *FNPRM* at para. 1036.

respectfully submits that the only logical and sustainable public interest conclusion in response to this question is an unqualified "yes."

Unquestionably, the Commission's goal in this proceeding was and is to advance the deployment of broadband, and, logically, once deployed, to maintain it. Yet, in the face of this goal, ROR ETCs already have cost recovery constraints imposed even though it is the ROR ETCs that have demonstrated the desire to push broadband capability deep into their networks.[169]

With respect to the cost recovery constraints placed on ROR ETCs, NRIC notes that there are at least five (5) existing or proposed constraints: (1) the caps placed on the HCLS; (2) the new cap on corporate operations expense within the ICLS program; (3) the caps on ROR ETCs' current intercarrier compensation recovery as reflected in the *Report and* Order; (4) the current policy of not allowing middle mile transport costs to be made part of the ROR ETCs' CAF recovery; [170] and (5) constraints imposed by the regression analysis on capital and operating expenditures that are now being debated. In the face of these constraints, there is now even greater uncertainty regarding the future of broadband availability in rural areas as well as the financial viability of ROR ETCs themselves.

Therefore, as a class of carriers, ROR ETCs have been asked to "belt tighten" significantly, a result that may very well render the $2.0B ROR support budget inadequate, but still are required to serve all voice customers in their respective service areas and to expand their

[169] Unlike the price cap carriers which may choose to forego funding in a given state or exit particularly high-cost rural areas by allowing a given area to have its broadband provider determined by a competitive bidding process, rural ROR carriers continue to have an "obligation to serve" their service areas comprehensively.

[170] As demonstrated in Section VIII *supra*, middle mile and Internet backbone costs are a significant portion of a the costs of providing broadband as defined by the Commission in the *Report and Order*. The uncertainty in the growth of those costs based on increased consumer demand and need for speed – and possible inclusion in the ROR carriers' budget – place additional pressures on ROR carriers' funding.

broadband coverage. Accordingly, redistribution of savings from other portions of the overall CAF budget to the ROR ETCs' budget should be ordered. Not only will this increase the likelihood of continuing the historical level of increased broadband deployment in high-cost rural areas served by ROR ETCs, but it should also reduce the uncertainty (and thus insufficiency) from the changes in the other ROR ETC mechanisms noted above.[171] Both of these results advance the "broadband-deployment-centric" policies of the *Report and Order*. Consequently, the public interest requires that the Commission should conclude that any available CAF funds should be used to increase the ROR ETCs' budget in order to advance broadband deployment to a greater extent than that which may occur if other classes of ETCs were provided the monies arising from CAF savings.

X. CONCLUSION

For all of the reasons provided in the foregoing Comments, the Nebraska Rural Independent Companies respectfully submit that the Commission should adopt and incorporate, the positions set forth in the foregoing Comments into its efforts to modernize the federal USF system.

Dated: January 18, 2012.

[171] Although ROR ETCs like the companies that comprise NRIC are small businesses and represent the economic engine for increased employment and economic advancements in their communities, NRIC also recognizes that the larger non-ROR carriers have certain cost advantages over smaller entities – the larger non-ROR ETCs can average costs across a broad cross-section of geographies with inherently different densities and serving characteristics and can share costs among different business units. Rural ROR ETCs do not have the benefit of these economies and, even where they are present, they are not available to the same degree.

Respectfully submitted,

Arlington Telephone Company, The Blair Telephone Company, Cambridge Telephone Company, Clarks Telecommunications Co., Consolidated Telephone Company, Consolidated Telco, Inc., Consolidated Telecom, Inc., The Curtis Telephone Company, Eastern Nebraska Telephone Company, Great Plains Communications, Inc., Hamilton Telephone Company, Hartington Telecommunications Co., Inc., Hershey Cooperative Telephone Co., K. & M. Telephone Company, Inc., The Nebraska Central Telephone Company, Northeast Nebraska Telephone Company, Rock County Telephone Company, Stanton Telecom, Inc., and Three River Telco

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Table A

Table 1. Comparison of FCC Exchange Boundary with State of Nebraska PSC Boundary Data

a. Method 1 . The method in which the population and housing information was derived from the census blocks by assigning the exchange information to the block centroid(s) that fell within the exchange. Information was assigned to the block centroids.
b. Method 2. The method in which the population and housing information was derived from the census blocks using the polygon block layer and correcting values based on the portion of the block that fall within the exchange.

		Housing					Exchange Area			Density				
		FCC-EIP		NE PSC			FCC-EIP	NE PSC		FCC-EIP		NE PSC		
Company	Exchange	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Allo Communications, Llc - Ne	-	4,145	4,145	0	0		536	0	-	8	8	0	0	
Arapahoe Telephone Co.	Arapahoe	573	574	580	581	100%	186	173	13	3	3	3	3.4	100%
Arapahoe Telephone Co.	Brule	261	268	271	274	101%	184	211	-27	1	1	1	1.3	101%
Arapahoe Telephone Co.	Farnam	91	92	136	134	98%	41	166	-125	2	2	1	0.8	98%
Arapahoe Telephone Co.	Hendley	67	68	39	39	100%	150	72	78	0	0	1	0.5	100%
Arapahoe Telephone Co.	Holbrook	162	161	163	162	99%	100	123	-23	2	2	1	1.3	99%
Arapahoe Telephone Co.	Loomis	257	261	259	272	105%	110	99	10	2	2	3	2.7	105%
Arapahoe Telephone Co.	Overton	428	422	421	415	99%	119	113	6	4	4	4	3.7	99%
Arlington Telephone Co.	Arlington	957	945	0	0		97	0	-	10	10	0	0	
Bandwidth.Com Clec, Llc - Ne	Alexandria	140	141	0	0		76	0	-	2	2	0	0	
Benkelman Telephone Co., Inc.	Benkelman	722	722	708	705	100%	516	535	-19	1	1	1	1.3	100%
Blair Telephone Co.	Fort_Calhoun	856	856	0	0		41	0	-	21	21	0	0	
Blair Telephone Co.	Kennard	329	334	0	0		36	0	-	9	9	0	0	
Blue Valley Tele-Communicaitons, Inc.	Ks_5 Nosumerfld	12	12	0	0		28	0	-	0	0	0	0	
Cambridge Telephone Co.	Bartley	211	209	188	186	99%	118	106	12	2	2	2	1.7	99%
Cambridge Telephone Co.	Cambridge	0	0	680	682	100%	0	270	-	0	0	3	2.5	100%
Cellco Partnership Dba Verizon Wireless - Ne	Clarks	306	307	0	0		90	0	-	3	3	0	0	
Cellco Partnership Dba Verizon Wireless - Ne	Ericson	20,366	20,366	0	0		235	0	-	87	87	0	0	
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Albion	1,315	1,315	1,202	1,204	100%	314	208	106	4	4	6	5.8	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Alma	646	646	611	609	100%	127	86	41	5	5	7	7.1	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Amherst	354	348	338	334	99%	138	124	14	3	3	3	2.7	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Battle_Creek	686	685	733	727	99%	95	125	-30	7	7	6	5.8	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Beaver_City	340	339	362	361	100%	98	154	-56	3	3	2	2.3	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Bertrand	534	532	530	521	98%	179	179	0	3	3	3	2.9	98%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Bloomington	108	108	87	95	109%	95	68	27	1	1	1	1.4	109%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Brunswick	160	160	173	173	100%	72	83	-12	2	2	2	2.1	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Columbus	10,560	10,558	10,858	10,860	100%	128	196	-68	82	82	55	55.4	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Duncan	645	645	293	291	99%	181	63	119	4	4	5	4.6	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Edison	146	144	113	112	99%	85	88	-3	2	2	1	1.3	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Franklin	605	605	566	565	100%	174	134	40	3	3	4	4.2	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Genoa	619	625	619	624	101%	140	128	12	4	4	5	4.9	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Greeley	353	352	281	279	99%	277	124	153	1	1	2	2.2	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Heartwell	98	102	81	82	101%	60	46	13	2	2	2	1.8	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Hildreth	347	347	286	287	100%	164	105	59	2	2	3	2.7	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Kearney	14,133	14,084	14,228	14,219	100%	233	235	-3	61	61	60	60.5	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Leigh	405	406	439	436	99%	96	121	-25	4	4	4	3.6	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Lindsay	298	299	253	253	100%	102	79	22	3	3	3	3.2	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Madison	1,066	1,076	1,106	1,101	100%	170	187	-18	6	6	6	5.9	100%

Company	Exchange	Housing					Exchange Area			Density				
		FCC-EIP		NE PSC			FCC-EIP	NE PSC		FCC-EIP		NE PSC		
		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Miller	117	115	118	121	103%	66	93	-27	2	2	1	1.3	103%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Monroe	295	290	234	225	96%	63	47	15	5	5	5	4.7	96%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Naponee	91	91	90	91	101%	80	74	6	1	1	1	1.2	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Neligh	961	961	910	911	100%	172	138	34	6	6	7	6.6	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Newman_Grove	498	498	521	523	100%	114	131	-17	4	4	4	4.0	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Orchard	374	373	356	355	100%	155	133	22	2	2	3	2.7	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Ord	1,511	1,511	1,402	1,394	99%	429	299	129	4	4	5	4.7	99%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Orleans	204	206	273	282	103%	15	110	-95	13	13	2	2.6	103%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Palmer	347	343	383	388	101%	82	136	-54	4	4	3	2.9	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Platte_Center	471	474	436	442	101%	95	84	11	5	5	5	5.3	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Pleasanton	387	382	370	362	98%	145	128	16	3	3	3	2.8	98%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Republican_City	187	187	174	175	101%	65	59	6	3	3	3	3.0	101%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Riverdale	286	336	340	352	104%	44	53	-9	6	8	6	6.6	104%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Stamford	168	173	166	159	96%	117	97	21	1	1	2	1.6	96%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Sumner	145	151	168	169	100%	75	116	-42	2	2	1	1.4	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Tilden	606	606	601	598	100%	131	124	7	5	5	5	4.8	100%
Citizens Telecom Of Ne Llc Dba Frontier Com Of Ne	Wilsonville	75	75	99	98	99%	59	125	-65	1	1	1	0.8	99%
Clarks Telephone Co.	Clarks	0	0	324	326	101%	0	104	-	0	0	3	3.1	101%
Clarks Telephone Co.	Staplehurst	447	450	252	253	101%	124	64	60	4	4	4	4.0	101%
Clarks Telephone Co.	Ulysses	0	0	181	178	98%	0	64	-	0	0	3	2.8	98%
Consolidated Telecom	Brady	322	340	343	340	99%	202	283	-81	2	2	1	1.2	100%
Consolidated Telecom	Eustis	481	481	355	349	98%	545	212	333	1	1	2	1.6	94%
Consolidated Telephone	Hyannis	866	867	590	597	101%	4,675	2,707	1,968	0	0	0	0.2	100%
Consolidated Telco, Inc.	Madrid	159	159	172	171	99%	123	120	3	1	1	1	1.4	100%
Consolidated Telecom	Maxwell	316	312	291	301	103%	322	188	134	1	1	2	1.6	107%
Consolidated Telco, Inc.	Maywood	316	315	225	222	99%	465	250	215	1	1	1	0.9	100%
Consolidated Telephone	Merna	358	358	455	458	101%	221	480	-259	2	2	1	1.0	111%
Consolidated Telephone	Mullen	326	326	360	354	98%	721	1,127	-406	1	1	0	0.3	100%
Consolidated Telco, Inc.	Paxton	406	403	440	435	99%	195	249	-54	2	2	2	1.7	94%
Consolidated Telephone	Thedford	613	612	622	629	101%	2,234	2,303	-69	0	0	0	0.3	100%
Consolidated Telco, Inc.	Wallace	291	289	241	241	100%	446	268	178	1	1	1	0.9	100%
Consolidated Telco, Inc.	Wellfleet	201	193	155	160	103%	487	293	194	0	0	1	0.5	100%
Cozad Telephone Co.	Cozad	2,093	2,097	2,098	2,107	100%	214	187	27	10	10	11	11.3	100%
Curtis Telephone Co.	Curtis	436	436	561	565	101%	83	414	-331	5	5	1	1.4	101%
Dalton Telephone Co.	Bushnell	152	152	180	173	96%	254	510	-255	1	1	0	0.3	96%
Dalton Telephone Co.	Dalton	655	658	277	271	98%	487	270	217	1	1	1	1.0	98%
Dalton Telephone Co.	Dix	204	204	172	172	100%	386	257	129	1	1	1	0.7	100%
Dalton Telephone Co.	Gurley	0	0	157	163	104%	0	104	-	0	0	2	1.6	104%
Dalton Telephone Co.	Lodgepole	0	0	279	277	99%	0	268	-	0	0	1	1.0	99%
Diller Telephone Co.	Diller	231	231	240	236	98%	78	84	-7	3	3	3	2.8	98%
Diller Telephone Co.	Harbine	113	108	98	109	112%	46	47	-1	2	2	2	2.3	112%
Diller Telephone Co.	Odell	284	281	282	280	99%	86	83	3	3	3	3	3.4	99%
Diller Telephone Co.	Virginia	61	64	79	75	95%	28	38	-10	2	2	2	2.0	95%
Eastern Nebraska Telephone Co.	Belden	98	99	0	0		38	0	-	3	3	0	0	
Eastern Nebraska Telephone Co.	Carroll	239	242	0	0		73	0	-	3	3	0	0	
Eastern Nebraska Telephone Co.	Macy	390	390	0	0		82	0	-	5	5	0	0	

Company	Exchange	Housing					Exchange Area			Density				
		FCC-EIP		NE PSC			FCC-EIP	NE PSC		FCC-EIP		NE PSC		
		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Eastern Nebraska Telephone Co.	Meadow_Grove	292	295	0	0		105	0	-	3	3	0	0	
Eastern Nebraska Telephone Co.	Osmond	484	484	0	0		84	0	-	6	6	0	0	
Eastern Nebraska Telephone Co.	Rosalie	146	146	0	0		46	0	-	3	3	0	0	
Eastern Nebraska Telephone Co.	Walthill	276	276	0	0		25	0	-	11	11	0	0	
Eastern Nebraska Telephone Co.	Winnebago	513	513	0	0		71	0	-	7	7	0	0	
Elsie Communications, Inc.	Elsie	173	174	146	147	101%	224	203	21	1	1	1	0.7	101%
Embarq	Bayard	0	0	839	840	100%	0	164	-	0	0	5	5.1	100%
Embarq	Broadwater	0	0	142	154	109%	0	248	-	0	0	1	0.6	109%
Embarq	Chappell	0	0	587	584	99%	0	274	-	0	0	2	2.1	99%
Embarq	Gering	0	0	3,707	3,713	100%	0	367	-	0	0	10	10.1	100%
Embarq	Kimball	0	0	1,418	1,423	100%	0	496	-	0	0	3	2.9	100%
Embarq	Lewellen	0	0	247	246	99%	0	282	-	0	0	1	0.9	99%
Embarq	Minatare	0	0	1,048	1,044	100%	0	373	-	0	0	3	2.8	100%
Embarq	Mitchell	0	0	1,215	1,213	100%	0	251	-	0	0	5	4.8	100%
Embarq	Morrill	0	0	875	874	100%	0	395	-	0	0	2	2.2	100%
Embarq	Oshkosh	0	0	652	649	100%	0	695	-	0	0	1	0.9	100%
Embarq	Potter	0	0	261	265	102%	0	256	-	0	0	1	1.0	102%
Embarq	Scottsbluff	0	0	8,260	8,257	100%	0	293	-	0	0	28	28.2	100%
Embarq	Wy_2	0	0	3	5	151%	0	19	-	0	0	0	0.2	151%
Foreign	Co_1 Northpetz	0	0	8	8	104%	0	28	-	0	0	0	0.3	104%
Foreign	Co_2 No Julesbg	0	0	18	20	112%	0	37	-	0	0	0	0.5	112%
Foreign	Co_3 Holyoke	0	0	0	1		0	15	-	0	0	0	0.1	
Foreign	Ks_1 No Herndon	0	0	1	1	134%	0	16	-	0	0	0	0.1	134%
Foreign	Ks_2 No Long Is	0	0	10	9	91%	0	20	-	0	0	0	0.4	91%
Foreign	Ks_3 No Woodruff	0	0	8	7	88%	0	14	-	0	0	1	0.5	88%
Foreign	Ks_4 No Mahaska	0	0	0	0		0	1	-	0	0	0	0	
Foreign	Ks_5 Nosumerfld	0	0	21	24	116%	0	43	-	0	0	0	0.6	116%
Foreign	Sd_1 Ardmore	0	0	0	0		0	15	-	0	0	0	0.0	
Foreign	Sd_2 Ardmore	0	0	15	12	77%	0	94	-	0	0	0	0.1	77%
Foreign	Sd_3 Gregory	0	0	1	1	70%	0	6	-	0	0	0	0.1	70%
Foreign	Sd_4 Wynot	0	0	77	77	100%	0	14	-	0	0	6	5.7	100%
Foreign	Sd_5 Pineridge	0	0	43	35	82%	0	35	-	0	0	1	1.0	82%
Foreign	Sd_6 Oelrichs	0	0	4	4	93%	0	122	-	0	0	0	0.0	93%
Foreign	Sd_7	0	0	11	9	81%	0	10	-	0	0	1	0.9	81%
Foreign	Wy_1	0	0	210	210	100%	0	46	-	0	0	5	4.6	100%
Glenwood Telephone Membership Corp.	Bladen	0	0	145	144	99%	0	70	-	0	0	2	2.0	99%
Glenwood Telephone Membership Corp.	Blue_Hill	1,862	1,852	625	620	99%	748	177	571	2	2	4	3.5	99%
Glenwood Telephone Membership Corp.	Campbell	0	0	217	217	100%	0	120	-	0	0	2	1.8	100%
Glenwood Telephone Membership Corp.	Funk	239	239	233	237	102%	125	124	1	2	2	2	1.9	102%
Glenwood Telephone Membership Corp.	Holstein	0	0	207	205	99%	0	83	-	0	0	3	2.5	99%
Glenwood Telephone Membership Corp.	Lawrence	0	0	282	281	100%	0	122	-	0	0	2	2.3	100%
Glenwood Telephone Membership Corp.	Norman	0	0	97	97	100%	0	90	-	0	0	1	1.1	100%
Glenwood Telephone Membership Corp.	Roseland	0	0	239	238	100%	0	76	-	0	0	3	3.1	100%
Glenwood Telephone Membership Corp.	Upland	0	0	108	106	98%	0	59	-	0	0	2	1.8	98%
Golden West Tel Coop Inc Dba Golden West Telecomm	-	93	93	0	0		196	0	-	0	0	0	0	
Golden West Tel Coop Inc Dba Golden West Telecomm	Sd_1 Ardmore	31	29	0	0		323	0	-	0	0	0	0	

Company	Exchange	Housing					Exchange Area			Density				
			FCC-EIP		NE PSC		FCC-EIP	NE PSC			FCC-EIP	NE PSC		
				Method	Method					Method	Method	Method		
		Method 1[a]	Method 2[b]	1[a]	2[b]	Pct Diff	sq mi	sq mi	delta	1[a]	2[b]	1[a]	Method 2[b]	Pct Diff
Great Plains Communications, Inc.	-	898	911	0	0		135	0	-	7	7	0	0	
Great Plains Communications, Inc.	Archer	72	78	97	94	96%	36	50	-14	2	2	2	1.9	96%
Great Plains Communications, Inc.	Arnold	526	527	480	486	101%	664	488	176	1	1	1	1.0	101%
Great Plains Communications, Inc.	Bancroft	355	355	353	357	101%	78	76	2	5	5	5	4.7	101%
Great Plains Communications, Inc.	Beemer	445	447	427	426	100%	67	63	4	7	7	7	6.7	100%
Great Plains Communications, Inc.	Belgrade	436	436	133	130	98%	208	93	115	2	2	1	1.4	98%
Great Plains Communications, Inc.	Bloomfield	831	833	831	828	100%	267	260	8	3	3	3	3.2	100%
Great Plains Communications, Inc.	Byron	129	129	114	111	98%	72	49	23	2	2	2	2.3	98%
Great Plains Communications, Inc.	Callaway	646	647	433	429	99%	632	284	348	1	1	2	1.5	99%
Great Plains Communications, Inc.	Cedar_Rapids	0	0	259	256	99%	0	94	-	0	0	3	2.7	99%
Great Plains Communications, Inc.	Center	82	79	89	82	93%	50	54	-4	2	2	2	1.5	93%
Great Plains Communications, Inc.	Chapman	296	294	589	579	98%	69	94	-25	4	4	6	6.2	98%
Great Plains Communications, Inc.	Chester	209	209	283	283	100%	83	136	-53	3	3	2	2.1	100%
Great Plains Communications, Inc.	Cody	161	152	131	129	99%	806	441	365	0	0	0	0.3	99%
Great Plains Communications, Inc.	Cotesfield	76	76	72	75	105%	66	66	0	1	1	1	1.1	105%
Great Plains Communications, Inc.	Creighton	689	697	750	754	100%	100	141	-41	7	7	5	5.3	100%
Great Plains Communications, Inc.	Crofton	755	748	767	763	99%	148	151	-3	5	5	5	5.0	99%
Great Plains Communications, Inc.	Crookston	143	140	72	77	106%	196	125	71	1	1	1	0.6	106%
Great Plains Communications, Inc.	Culbertson	425	426	486	486	100%	127	268	-141	3	3	2	1.8	100%
Great Plains Communications, Inc.	Deshler	449	449	483	491	102%	74	120	-47	6	6	4	4.1	102%
Great Plains Communications, Inc.	Dodge	454	455	448	446	99%	86	82	5	5	5	5	5.5	99%
Great Plains Communications, Inc.	Elgin	421	420	527	530	101%	81	219	-137	5	5	2	2.4	101%
Great Plains Communications, Inc.	Ewing	217	217	255	256	100%	71	147	-76	3	3	2	1.7	100%
Great Plains Communications, Inc.	Gordon	952	952	1,103	1,105	100%	343	1,146	-802	3	3	1	1.0	100%
Great Plains Communications, Inc.	Grant	794	794	736	738	100%	411	300	111	2	2	2	2.5	100%
Great Plains Communications, Inc.	Hay_Springs	405	406	476	469	98%	166	311	-144	2	2	2	1.5	98%
Great Plains Communications, Inc.	Hayes_Center	352	352	212	213	101%	503	315	189	1	1	1	0.7	101%
Great Plains Communications, Inc.	Herman	333	341	331	344	104%	74	81	-6	4	5	4	4.3	104%
Great Plains Communications, Inc.	Huntlergan	81	82	126	122	97%	81	120	-39	1	1	1	1.0	97%
Great Plains Communications, Inc.	Imperial	1,326	1,326	1,322	1,326	100%	713	686	27	2	2	2	1.9	100%
Great Plains Communications, Inc.	Indianola	383	385	449	440	98%	181	225	-43	2	2	2	2.0	98%
Great Plains Communications, Inc.	Kilgore	122	120	68	71	105%	555	157	399	0	0	0	0.5	105%
Great Plains Communications, Inc.	Merriman	185	195	114	123	108%	1,081	505	576	0	0	0	0.2	108%
Great Plains Communications, Inc.	Mirage_Flats	95	95	117	113	97%	132	222	-90	1	1	1	0.5	97%
Great Plains Communications, Inc.	Niobrara	445	443	444	447	101%	134	155	-21	3	3	3	2.9	101%
Great Plains Communications, Inc.	North_Bend	721	720	741	739	100%	108	113	-5	7	7	7	6.6	100%
Great Plains Communications, Inc.	Oakdale	169	169	183	186	102%	20	40	-21	9	9	5	4.6	102%
Great Plains Communications, Inc.	Oconto	214	208	242	241	99%	212	261	-49	1	1	1	0.9	99%
Great Plains Communications, Inc.	Page	139	139	165	163	99%	50	92	-43	3	3	2	1.8	99%
Great Plains Communications, Inc.	Palisade	202	201	286	279	97%	125	178	-53	2	2	2	1.6	97%
Great Plains Communications, Inc.	Petersburg	365	365	328	332	101%	201	198	4	2	2	2	1.7	101%
Great Plains Communications, Inc.	Ponca	508	508	580	578	100%	38	76	-38	13	13	8	7.6	100%
Great Plains Communications, Inc.	Primrose	0	0	78	80	102%	0	62	-	0	0	1	1.3	102%
Great Plains Communications, Inc.	Red_Cloud	666	669	782	782	100%	189	315	-126	4	4	2	2.5	100%
Great Plains Communications, Inc.	Rushville	627	627	635	630	99%	325	592	-267	2	2	1	1.1	99%
Great Plains Communications, Inc.	Scribner	620	613	610	609	100%	87	89	-2	7	7	7	6.9	100%

Company	Exchange	Housing					Exchange Area			Density				
		FCC-EIP		NE PSC			FCC-EIP	NE PSC		FCC-EIP		NE PSC		
		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Great Plains Communications, Inc.	Snyder	228	229	245	243	99%	57	62	-5	4	4	4	3.9	99%
Great Plains Communications, Inc.	Spalding	266	267	380	383	101%	29	226	-197	9	9	2	1.7	101%
Great Plains Communications, Inc.	St_Edward	0	0	472	469	99%	0	125	-	0	0	4	3.7	99%
Great Plains Communications, Inc.	Stapleton	323	321	349	345	99%	536	572	-36	1	1	1	0.6	99%
Great Plains Communications, Inc.	Stratton	243	243	256	259	101%	178	216	-38	1	1	1	1.2	101%
Great Plains Communications, Inc.	Sutherland	660	659	663	664	100%	240	264	-24	3	3	3	2.5	100%
Great Plains Communications, Inc.	Trenton	419	419	393	393	100%	251	211	40	2	2	2	1.9	100%
Great Plains Communications, Inc.	Tryon	211	211	207	204	98%	859	915	-56	0	0	0	0.2	98%
Great Plains Communications, Inc.	Venango	113	113	113	113	100%	127	86	41	1	1	1	1.3	100%
Great Plains Communications, Inc.	Verdigre	404	405	399	395	99%	195	176	19	2	2	2	2.2	99%
Great Plains Communications, Inc.	Walnut	103	104	46	51	110%	212	63	150	0	0	1	0.8	110%
Great Plains Communications, Inc.	Wausa	518	518	487	484	99%	165	146	20	3	3	3	3.3	99%
Great Plains Communications, Inc.	Wilcox	194	193	225	221	98%	33	66	-33	6	6	3	3.4	98%
Great Plains Communications, Inc.	Winnetoon	115	110	110	115	105%	80	91	-11	1	1	1	1.3	105%
Great Plains Communications, Inc.	Wisner	811	807	808	805	100%	168	169	-1	5	5	5	4.8	100%
Great Plains Communications, Inc.	Wolbach	218	215	233	231	99%	128	153	-25	2	2	2	1.5	99%
Great Plains Communications, Inc.	Wood_Lake	226	226	84	81	97%	1,186	311	875	0	0	0	0.3	97%
Great Plains Communications, Inc.	Wynot	0	0	540	563	104%	0	170	-	0	0	3	3.3	104%
Hamilton Telephone Co.	Aurora	2,043	2,045	2,043	2,045	100%	126	125	1	16	16	16	16.4	100%
Hamilton Telephone Co.	Doniphan	648	613	666	637	96%	40	42	-2	16	15	16	15.2	96%
Hamilton Telephone Co.	Giltner	276	274	262	259	99%	94	84	10	3	3	3	3.1	99%
Hamilton Telephone Co.	Hampton	281	283	300	290	97%	62	63	-1	5	5	5	4.6	97%
Hamilton Telephone Co.	Hordville	119	119	114	120	105%	31	28	3	4	4	4	4.3	105%
Hamilton Telephone Co.	Marquette	236	234	233	234	100%	78	78	1	3	3	3	3.0	100%
Hamilton Telephone Co.	Phillips	336	335	333	336	101%	55	55	0	6	6	6	6.2	101%
Hamilton Telephone Co.	Stockham	67	64	56	56	100%	32	28	4	2	2	2	2.0	100%
Hamilton Telephone Co.	Trumbull	136	136	134	136	101%	47	37	11	3	3	4	3.7	101%
Hartington Telecommunications, Inc.	Hartington	1,024	1,022	1,020	1,010	99%	160	142	17	6	6	7	7.1	99%
Hartman Telephone Exchange, Inc.	Danbury	0	0	107	108	101%	0	90	-	0	0	1	1.2	101%
Hartman Telephone Exchange, Inc.	Haigler	175	175	136	136	100%	405	272	133	0	0	1	0.5	100%
Hartman Telephone Exchange, Inc.	Lebanon	124	124	54	52	97%	70	45	25	2	2	1	1.2	97%
Hemingford Cooperative Telephone Company	Hemingford	0	0	630	628	100%	0	758	-	0	0	1	0.8	100%
Henderson Cooperative Telephone Co.	Henderson	644	647	623	634	102%	98	89	8	7	7	7	7.1	102%
Hershey Cooperative Telephone Co.	Hershey	670	660	659	651	99%	203	144	59	3	3	5	4.5	99%
Hooper Telephone Co.	-	185	186	0	0		39	0	-	5	5	0	0	
Hooper Telephone Co.	Hooper	773	771	965	957	99%	128	167	-39	6	6	6	5.7	99%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Arlington	0	0	948	942	99%	0	98	-	0	0	10	9.6	99%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Bassett	0	0	517	528	102%	0	630	-	0	0	1	0.8	102%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Belden	0	0	90	88	97%	0	33	-	0	0	3	2.6	97%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Blair	4,768	4,743	4,737	4,689	99%	120	122	-2	40	40	39	38.3	99%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Carroll	0	0	251	250	100%	0	77	-	0	0	3	3.2	100%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Fort_Calhoun	0	0	894	943	105%	0	37	-	0	0	24	25.2	105%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Kennard	0	0	342	336	98%	0	37	-	0	0	9	9.1	98%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Macy	0	0	270	274	101%	0	20	-	0	0	14	13.8	101%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Meadow_Grove	0	0	273	271	99%	0	87	-	0	0	3	3.1	99%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Newport	0	0	145	140	96%	0	361	-	0	0	0	0.4	96%

Company	Exchange	Housing					Exchange Area			Density				
			FCC-EIP		NE PSC		FCC-EIP	NE PSC			FCC-EIP	NE PSC		
		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Osmond	0	0	445	445	100%	0	83	-	0	0	5	5.4	100%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Rosalie	0	0	125	124	99%	0	42	-	0	0	3	3.0	99%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Walthill	0	0	401	391	97%	0	73	-	0	0	5	5.3	97%
Huntel Cablevision, Inc. Dba Huntel Comms - Ne	Winnebago	0	0	510	501	98%	0	65	-	0	0	8	7.7	98%
J.B.N. Telephone Co., Inc.	Ks 4 No Mahaska	85	85	0	0		69	0	-	1	1	0	0	
K & M Telephone Company	Chambers	262	263	345	351	102%	194	479	-286	1	1	1	0.7	102%
K & M Telephone Company	Inman	154	155	144	139	96%	74	114	-40	2	2	1	1.2	96%
Keystone - Arthur Telephone Company	Keystone	162	165	181	191	105%	288	427	-138	1	1	0	0.4	105%
Keystone - Arthur Telephone Company	Le_Moyne	232	230	231	232	100%	131	141	-9	2	2	2	1.6	100%
Mobius Communications Company - Ne	Alliance	621	621	0	0		607	0	-	1	1	0	0	
Nebraska Central Telephone Co.	-	275	277	0	0		367	0	-	1	1	0	0	
Nebraska Central Telephone Co.	Ansley	320	320	406	410	101%	67	205	-139	5	5	2	2.0	101%
Nebraska Central Telephone Co.	Arcadia	175	175	237	238	100%	40	132	-92	4	4	2	1.8	100%
Nebraska Central Telephone Co.	Ashton	253	251	162	158	97%	123	71	53	2	2	2	2.2	97%
Nebraska Central Telephone Co.	Boelus	175	174	183	181	99%	40	48	-8	4	4	4	3.7	99%
Nebraska Central Telephone Co.	Burwell	892	892	984	992	101%	341	417	-76	3	3	2	2.4	101%
Nebraska Central Telephone Co.	Comstock	275	275	104	102	98%	332	99	233	1	1	1	1.0	98%
Nebraska Central Telephone Co.	Dannebrog	317	321	329	332	101%	63	67	-3	5	5	5	5.0	101%
Nebraska Central Telephone Co.	Elba	137	138	144	142	98%	40	40	0	3	3	4	3.5	98%
Nebraska Central Telephone Co.	Ericson	0	0	151	157	104%	0	245	-	0	0	1	0.6	104%
Nebraska Central Telephone Co.	Gibbon	1,041	1,046	1,036	1,042	101%	129	127	3	8	8	8	8.2	101%
Nebraska Central Telephone Co.	Litchfield	222	222	241	234	97%	81	132	-51	3	3	2	1.8	97%
Nebraska Central Telephone Co.	Mason_City	190	190	167	170	102%	220	147	73	1	1	1	1.2	102%
Nebraska Central Telephone Co.	North_Burwell	0	0	78	81	104%	0	386	-	0	0	0	0.2	104%
Nebraska Central Telephone Co.	North_Loup	168	168	261	261	100%	3	104	-102	61	62	2	2.5	100%
Nebraska Central Telephone Co.	Ravenna	949	951	995	998	100%	191	227	-36	5	5	4	4.4	100%
Nebraska Central Telephone Co.	Rockville	122	121	85	87	102%	71	34	37	2	2	2	2.5	102%
Nebraska Central Telephone Co.	Sargent	343	343	403	407	101%	127	225	-98	3	3	2	1.8	101%
Nebraska Central Telephone Co.	Scotia	272	272	248	249	101%	162	132	30	2	2	2	1.9	101%
Nebraska Central Telephone Co.	Shelton	581	585	590	593	101%	92	96	-5	6	6	6	6.1	101%
Nebraska Central Telephone Co.	Taylor	275	275	212	209	98%	571	341	230	0	0	1	0.6	98%
New Cingular Wireless Pcs, Llc - Il	Omaha_Douglas	17,850	17,876	0	0		10	0	-	1,761	1,763	0	0	
Northeast Nebraska Telephone Co.	-	473	475	0	0		58	0	-	8	8	0	0	
Northeast Nebraska Telephone Co.	Allen	320	319	250	259	104%	62	47	15	5	5	5	5.5	104%
Northeast Nebraska Telephone Co.	Bartlett	184	183	142	123	87%	390	208	182	0	0	1	0.6	87%
Northeast Nebraska Telephone Co.	Bristow	422	423	66	67	102%	213	50	162	2	2	1	1.3	102%
Northeast Nebraska Telephone Co.	Butte	187	186	237	239	101%	45	140	-96	4	4	2	1.7	101%
Northeast Nebraska Telephone Co.	Clearwater	388	389	368	370	100%	204	184	20	2	2	2	2.0	100%
Northeast Nebraska Telephone Co.	Coleridge	345	344	356	358	100%	85	94	-10	4	4	4	3.8	100%
Northeast Nebraska Telephone Co.	Craig	239	244	250	243	97%	83	84	-1	3	3	3	2.9	97%
Northeast Nebraska Telephone Co.	Decatur	326	324	332	336	101%	55	61	-6	6	6	5	5.5	101%
Northeast Nebraska Telephone Co.	Dixon	209	214	246	242	98%	70	88	-17	3	3	3	2.8	98%
Northeast Nebraska Telephone Co.	Jackson	483	488	467	462	99%	102	90	12	5	5	5	5.1	99%
Northeast Nebraska Telephone Co.	Linwood	0	0	295	298	101%	0	76	-	0	0	4	3.9	101%
Northeast Nebraska Telephone Co.	Long_Pine	0	0	238	236	99%	0	194	-	0	0	1	1.2	99%
Northeast Nebraska Telephone Co.	Newcastle	554	550	481	474	99%	102	208	-106	5	5	2	2.3	99%

Company	Exchange	Housing					Exchange Area			Density				
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		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Northeast Nebraska Telephone Co.	Prague	331	330	336	326	97%	86	81	5	4	4	4	4.1	97%
Northeast Nebraska Telephone Co.	Spencer	0	0	329	330	100%	0	103	-	0	0	3	3.2	100%
Northeast Nebraska Telephone Co.	Stuart	418	417	383	386	101%	289	285	4	1	1	1	1.4	101%
Northeast Nebraska Telephone Co.	Waterbury	0	0	83	87	105%	0	23	-	0	0	4	3.7	105%
Northeast Nebraska Telephone Co.	Weston	431	439	438	442	101%	97	97	0	4	5	4	4.5	101%
Northeast Nebraska Telephone Co.	Winside	350	349	324	330	102%	74	66	8	5	5	5	5.0	102%
Npsc District 1	Ds1	0	0	0	1		0	0	-	0	0	0	1	
Npsc District 2	Ds2	0	0	0	0		0	0	-	0	0	0	1	
Npsc District 3	Ds3	0	0	0	0		0	0	-	0	0	0	1	
Npsc District 4	Ds4	0	0	0	8		0	0	-	0	0	0	119	
Npsc District 5	Ds5	0	0	0	0		0	0	-	0	0	0	2	
Peetz Cooperative Telephone Co.	Co_1 Northpetz	29	27	0	0		88	0	-	0	0	0	0	
Pierce Telephone Co.	Hoskins	411	409	364	375	103%	82	75	7	5	5	5	5.0	103%
Pierce Telephone Co.	Pierce	1,220	1,222	1,240	1,246	100%	257	211	46	5	5	6	5.9	100%
Pinpoint Wireless, Inc.	Cambridge	590	590	0	0		118	0	-	5	5	0	0	
Plainview Telephone Co., Inc.	Plainview	810	811	836	846	101%	158	188	-30	5	5	4	4.5	101%
Qwest Corporation	-	9	4	0	0		4	0	-	2	1	0	0	
Qwest Corporation	Ainsworth	0	0	1,145	1,142	100%	0	764	-	0	0	1	1.5	100%
Qwest Corporation	Alliance	0	0	4,299	4,310	100%	0	1,578	-	0	0	3	2.7	100%
Qwest Corporation	Atkinson	906	906	977	974	100%	276	581	-306	3	3	2	1.7	100%
Qwest Corporation	Atlanta	68	67	103	98	95%	28	77	-49	2	2	1	1.3	95%
Qwest Corporation	Axtell	483	487	386	379	98%	68	54	14	7	7	7	7.0	98%
Qwest Corporation	Big Springs	302	297	305	305	100%	168	224	-56	2	2	1	1.4	100%
Qwest Corporation	Bridgeport	781	781	1,043	1,035	99%	310	526	-216	3	3	2	2.0	99%
Qwest Corporation	Broken_Bow	2,062	2,063	2,031	2,036	100%	457	330	127	5	5	6	6.2	100%
Qwest Corporation	Cairo	548	547	549	544	99%	102	93	9	5	5	6	5.8	99%
Qwest Corporation	Central_City	1,688	1,687	1,671	1,667	100%	169	153	16	10	10	11	10.9	100%
Qwest Corporation	Chadron	2,832	2,830	2,821	2,831	100%	572	592	-20	5	5	5	4.8	100%
Qwest Corporation	Clarkson	507	505	464	460	99%	116	97	19	4	4	5	4.8	99%
Qwest Corporation	Co_2 No Julesbg	35	34	0	0		81	0	-	0	0	0	0	
Qwest Corporation	Crawford	832	830	835	849	102%	765	884	-119	1	1	1	1.0	102%
Qwest Corporation	Elm_Creek	612	620	631	628	99%	116	123	-7	5	5	5	5.1	99%
Qwest Corporation	Elwood	848	839	820	826	101%	185	174	11	5	5	5	4.8	101%
Qwest Corporation	Emerson	546	544	534	536	100%	104	101	3	5	5	5	5.3	100%
Qwest Corporation	Farwell	140	142	137	137	100%	61	62	-1	2	2	2	2.2	100%
Qwest Corporation	Fremont	12,844	12,855	12,834	12,855	100%	163	156	7	79	79	82	82.2	100%
Qwest Corporation	Fullerton	806	806	761	764	100%	248	199	49	3	3	4	3.8	100%
Qwest Corporation	Gothenburg	1,796	1,794	1,850	1,847	100%	161	268	-106	11	11	7	6.9	100%
Qwest Corporation	Grand_Island	0	0	20,051	20,071	100%	0	214	-	0	0	94	93.6	100%
Qwest Corporation	Harrison	262	266	237	239	101%	942	763	178	0	0	0	0.3	101%
Qwest Corporation	Holdrege	2,737	2,739	2,719	2,727	100%	187	179	8	15	15	15	15.2	100%
Qwest Corporation	Homer	398	399	412	412	100%	57	67	-10	7	7	6	6.2	100%
Qwest Corporation	Howells	425	425	461	470	102%	90	110	-20	5	5	4	4.3	102%
Qwest Corporation	Humphrey	876	874	867	871	101%	173	174	0	5	5	5	5.0	101%
Qwest Corporation	Laurel	623	622	601	599	100%	111	93	17	6	6	6	6.4	100%
Qwest Corporation	Lexington	4,050	4,056	4,009	4,015	100%	338	230	109	12	12	17	17.5	100%

Company	Exchange	Housing					Exchange Area			Density				
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		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Qwest Corporation	Loup_City	654	654	727	731	101%	217	223	-6	3	3	3	3.3	101%
Qwest Corporation	Mc_Cook	3,957	3,956	3,885	3,898	100%	387	335	52	10	10	12	11.6	100%
Qwest Corporation	Minden	1,610	1,610	1,559	1,558	100%	201	184	17	8	8	8	8.5	100%
Qwest Corporation	Norfolk	12,285	12,275	12,233	12,235	100%	207	190	16	59	59	64	64.2	100%
Qwest Corporation	North_Platte	12,516	12,524	12,486	12,475	100%	673	536	138	19	19	23	23.3	100%
Qwest Corporation	O_Neill	2,071	2,069	2,103	2,107	100%	636	543	92	3	3	4	3.9	100%
Qwest Corporation	Oakland	757	754	756	762	101%	100	106	-6	8	8	7	7.2	101%
Qwest Corporation	Ogallala	2,646	2,644	2,653	2,652	100%	258	263	-5	10	10	10	10.1	100%
Qwest Corporation	Omaha_135Th_St	19,746	19,695	19,790	19,775	100%	18	17	1	1,105	1,102	1,154	1,153.0	100%
Qwest Corporation	Omaha_156_St	27,283	27,238	26,924	26,899	100%	35	34	1	786	785	793	791.9	100%
Qwest Corporation	Omaha_78Th_St	13,853	13,698	14,080	14,036	100%	40	38	2	346	342	374	373.3	100%
Qwest Corporation	Omaha_84Th_St	29,908	29,864	30,363	30,371	100%	61	60	1	494	493	508	507.7	100%
Qwest Corporation	Omaha_90Th_St	18,935	18,872	18,528	18,470	100%	14	14	0	1,342	1,338	1,357	1,352.8	100%
Qwest Corporation	Omaha_Bellevue	18,910	19,012	18,702	18,718	100%	43	45	-2	435	438	415	415.6	100%
Qwest Corporation	Omaha_Bennington	1,560	1,546	2,523	2,535	100%	36	36	-1	44	43	69	69.8	100%
Qwest Corporation	Omaha_Douglas	0	0	17,371	17,348	100%	0	17	-	0	0	1,042	1,040.1	100%
Qwest Corporation	Omaha_Elkhorn_Waterloo	9,066	9,031	9,238	9,226	100%	52	54	-2	175	174	171	170.4	100%
Qwest Corporation	Omaha_Fort_St	32,080	32,169	31,555	31,594	100%	32	31	1	1,003	1,006	1,029	1,030.6	100%
Qwest Corporation	Omaha_Fowler_St	19,009	19,090	18,298	18,391	101%	39	35	4	493	496	529	531.7	101%
Qwest Corporation	Omaha_Gretna	3,538	3,609	3,771	3,804	101%	69	69	-1	51	53	54	54.9	101%
Qwest Corporation	Omaha_Izard_St	26,846	26,955	27,652	27,655	100%	12	13	-1	2,233	2,243	2,196	2,196.6	100%
Qwest Corporation	Omaha_O_St	19,514	19,415	19,261	19,225	100%	25	21	4	792	788	912	910.5	100%
Qwest Corporation	Omaha_Springfield	1,186	1,215	1,204	1,204	100%	55	52	4	21	22	23	23.3	100%
Qwest Corporation	Omaha_Valley	1,654	1,672	1,639	1,625	99%	57	54	4	29	29	31	30.4	99%
Qwest Corporation	Oxford	459	455	422	425	101%	146	98	48	3	3	4	4.3	101%
Qwest Corporation	Pender	766	769	774	779	101%	151	154	-3	5	5	5	5.1	101%
Qwest Corporation	Pilger	343	344	309	308	100%	99	81	19	3	3	4	3.8	100%
Qwest Corporation	Randolph	680	679	706	698	99%	147	152	-5	5	5	5	4.6	99%
Qwest Corporation	Schuyler	2,416	2,417	2,382	2,384	100%	218	203	15	11	11	12	11.7	100%
Qwest Corporation	Sd_4 Wynot	87	85	0	0		13	0	-	7	6	0	0	
Qwest Corporation	Sidney	3,390	3,384	3,386	3,384	100%	489	488	1	7	7	7	6.9	100%
Qwest Corporation	Silver Creek	379	379	0	0		128	0	-	3	3	0	0	
Qwest Corporation	Silver_Creek	0	0	306	305	100%	0	85	-	0	0	4	3.6	100%
Qwest Corporation	Sosioux Cy	6,114	6,110	6,108	6,108	100%	70	70	0	88	88	88	87.6	100%
Qwest Corporation	St_Libory	352	353	356	361	102%	75	75	0	5	5	5	4.8	102%
Qwest Corporation	St_Paul	1,373	1,373	1,347	1,338	99%	175	137	38	8	8	10	9.8	99%
Qwest Corporation	Tekamah	1,573	1,576	1,635	1,636	100%	130	275	-146	12	12	6	5.9	100%
Qwest Corporation	Valentine	1,466	1,469	1,702	1,699	100%	169	1,231	-1,062	9	9	1	1.4	100%
Qwest Corporation	Wakefield	781	781	777	781	100%	107	106	1	7	7	7	7.4	100%
Qwest Corporation	Wayne	2,347	2,347	2,340	2,341	100%	144	139	5	16	16	17	16.9	100%
Qwest Corporation	West_Point	1,953	1,948	1,960	1,958	100%	173	171	3	11	11	11	11.5	100%
Qwest Corporation	Wood_River	737	735	720	723	100%	107	96	10	7	7	7	7.5	100%
Rock County Telephone Co.	Bassett	575	575	0	0		762	0	-	1	1	0	0	
Rock County Telephone Co.	Newport	110	110	0	0		249	0	-	0	0	0	0	
Rt Communications	-	255	255	0	0		355	0	-	1	1	0	0	
Rural Telephone Service Co., Inc.	Ks_3 No Woodruff	48	46	0	0		66	0	-	1	1	0	0	

Company	Exchange	Housing					Exchange Area			Density				
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		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Sodtown Telephone Co.	-	69	67	0	0		57	0	-	1	1	0	0	
Sodtown Telephone Co.	St_Michael	0	0	69	68	99%	0	57	-	0	0	1	1.2	99%
Southeast Nebraska Communications, Inc.	-	366	366	0	0		79	0	-	5	5	0	0	
Southeast Nebraska Communications, Inc.	Falls_City	0	0	2,511	2,511	100%	0	232	-	0	0	11	10.8	100%
Southeast Nebraska Communications, Inc.	Tri_City	0	0	481	482	100%	0	165	-	0	0	3	2.9	100%
Stanton Telecom Inc.	Stanton	1,006	1,003	964	959	99%	206	164	42	5	5	6	5.9	99%
Three River Telco	Ainsworth	1,198	1,198	0	0		1,025	0	-	1	1	0	0	
Three River Telco	Johnstown	81	81	98	98	100%	189	266	-77	0	0	0	0.4	100%
Three River Telco	Lynch	177	177	223	222	100%	93	223	-129	2	2	1	1.0	100%
Three River Telco	Naper	207	207	135	138	102%	442	193	249	0	0	1	0.7	102%
Three River Telco	Springview	274	274	314	309	98%	474	541	-67	1	1	1	0.6	98%
Three River Telco	Verdel	77	78	76	77	101%	69	63	6	1	1	1	1.2	101%
United States Cellular - Ne	-	39,241	39,252	0	0		68	0	-	577	577	0	0	
United States Cellular - Ne	Falls_City	2,604	2,604	0	0		290	0	-	9	9	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	-	199	198	0	0		31	0	-	6	6	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Bayard	1,164	1,164	0	0		883	0	-	1	1	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Broadwater	161	161	0	0		247	0	-	1	1	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Chappell	576	577	0	0		258	0	-	2	2	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Gering	3,648	3,628	0	0		165	0	-	22	22	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Kimball	1,236	1,236	0	0		43	0	-	28	28	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Lewellen	264	265	0	0		415	0	-	1	1	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Minatare	1,089	1,093	0	0		484	0	-	2	2	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Mitchell	1,189	1,191	0	0		83	0	-	14	14	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Morrill	896	899	0	0		390	0	-	2	2	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Oshkosh	634	633	0	0		652	0	-	1	1	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Potter	239	244	0	0		169	0	-	1	1	0	0	
United Tel Co Of The West - Ne Dba Centurylink-Ne	Scottsbluff	8,233	8,244	0	0		445	0	-	18	19	0	0	
Unserved	Unserved_1	0	0	7	5	75%	0	173	-	0	0	0	0.0	75%
Unserved	Unserved_10	0	0	2	1	69%	0	9	-	0	0	0	0.2	69%
Unserved	Unserved_11	0	0	7	24	341%	0	117	-	0	0	0	0.2	341%
Unserved	Unserved_12	0	0	3	5	167%	0	57	-	0	0	0	0.1	167%
Unserved	Unserved_13	0	0	22	14	66%	0	42	-	0	0	1	0.3	66%
Unserved	Unserved_14	0	0	2	2	114%	0	10	-	0	0	0	0.2	114%
Unserved	Unserved_15	0	0	4	3	67%	0	15	-	0	0	0	0.2	67%
Unserved	Unserved_16	0	0	9	8	91%	0	46	-	0	0	0	0.2	91%
Unserved	Unserved_17	0	0	23	20	88%	0	62	-	0	0	0	0.3	88%
Unserved	Unserved_18	0	0	16	13	83%	0	142	-	0	0	0	0.1	83%
Unserved	Unserved_19	0	0	0	1		0	19	-	0	0	0	0.1	
Unserved	Unserved_2	0	0	31	20	65%	0	191	-	0	0	0	0.1	65%
Unserved	Unserved_20	0	0	2	4	214%	0	32	-	0	0	0	0.1	214%
Unserved	Unserved_21	0	0	21	18	87%	0	50	-	0	0	0	0.4	87%
Unserved	Unserved_22	0	0	0	0		0	3	-	0	0	0	0.1	
Unserved	Unserved_23	0	0	2	2	116%	0	10	-	0	0	0	0.2	116%
Unserved	Unserved_24	0	0	4	2	55%	0	23	-	0	0	0	0.1	55%
Unserved	Unserved_25	0	0	0	0		0	4	-	0	0	0	0	
Unserved	Unserved_26	0	0	3	2	65%	0	3	-	0	0	1	0.6	65%

Company	Exchange	Housing					Exchange Area			Density				
			FCC-EIP		NE PSC		FCC-EIP	NE PSC			FCC-EIP		NE PSC	
		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Unserved	Unserved_27	0	0	0	3		0	15	-	0	0	0	0.2	
Unserved	Unserved_28	0	0	3	6	185%	0	43	-	0	0	0	0.1	185%
Unserved	Unserved_29	0	0	4	2	59%	0	4	-	0	0	1	0.5	59%
Unserved	Unserved_3	0	0	28	21	77%	0	383	-	0	0	0	0.1	77%
Unserved	Unserved_30	0	0	2	2	92%	0	6	-	0	0	0	0.3	92%
Unserved	Unserved_31	0	0	9	8	85%	0	13	-	0	0	1	0.6	85%
Unserved	Unserved_32	0	0	2	3	158%	0	9	-	0	0	0	0.3	158%
Unserved	Unserved_33	0	0	0	0		0	2	-	0	0	0	0	
Unserved	Unserved_34	0	0	0	0		0	3	-	0	0	0	0.1	
Unserved	Unserved_35	0	0	3	3	84%	0	6	-	0	0	0	0.4	84%
Unserved	Unserved_36Ft_Rob	0	0	8	2	21%	0	14	-	0	0	1	0.1	21%
Unserved	Unserved_4	0	0	0	2		0	19	-	0	0	0	0	
Unserved	Unserved_5	0	0	11	5	49%	0	181	-	0	0	0	0.0	49%
Unserved	Unserved_6	0	0	0	2		0	15	-	0	0	0	0.1	
Unserved	Unserved_7	0	0	4	2	48%	0	25	-	0	0	0	0.1	48%
Unserved	Unserved_8	0	0	0	1		0	13	-	0	0	0	0	
Unserved	Unserved_9	0	0	1	1	62%	0	8	-	0	0	0	0.1	62%
Vivian Tel Co Dba Golden West Telecommunications	-	107	107	0	0		96	0	-	1	1	0	0	
Vivian Tel Co Dba Golden West Telecommunications	Sd_3 Gregory	71	71	0	0		237	0	-	0	0	0	0	
Wauneta Telephone Co.	Wauneta	355	355	452	452	100%	185	409	-225	2	2	1	1.1	100%
Windstream Nebraska, Inc.	-	2,411	2,413	0	0		32	0	-	74	74	0	0	
Windstream Nebraska, Inc.	Adams	356	371	364	374	103%	67	64	2	5	6	6	5.8	103%
Windstream Nebraska, Inc.	Alexandria	0	0	130	131	101%	0	64	-	0	0	2	2.1	101%
Windstream Nebraska, Inc.	Ashland	1,890	1,912	1,920	1,915	100%	156	140	16	12	12	14	13.7	100%
Windstream Nebraska, Inc.	Auburn	1,701	1,701	1,894	1,891	100%	65	159	-94	26	26	12	11.9	100%
Windstream Nebraska, Inc.	Avoca	213	216	186	193	104%	48	40	9	4	4	5	4.9	104%
Windstream Nebraska, Inc.	Barneston	120	118	107	111	104%	49	45	4	2	2	2	2.5	104%
Windstream Nebraska, Inc.	Beatrice	6,277	6,275	6,287	6,275	100%	209	212	-3	30	30	30	29.5	100%
Windstream Nebraska, Inc.	Beaver_Crossing	321	322	330	327	99%	61	59	2	5	5	6	5.5	99%
Windstream Nebraska, Inc.	Bellwood	306	305	370	377	102%	48	64	-16	6	6	6	5.9	102%
Windstream Nebraska, Inc.	Benedict	202	202	189	184	97%	71	62	9	3	3	3	3.0	97%
Windstream Nebraska, Inc.	Bennet	726	727	709	716	101%	59	59	0	12	12	12	12.1	101%
Windstream Nebraska, Inc.	Bradshaw	193	194	190	193	101%	48	52	-4	4	4	4	3.7	101%
Windstream Nebraska, Inc.	Brainard	315	315	335	345	103%	75	86	-11	4	4	4	4.0	103%
Windstream Nebraska, Inc.	Brock	133	133	105	104	99%	51	28	23	3	3	4	3.8	99%
Windstream Nebraska, Inc.	Brownville	170	170	119	117	98%	37	12	25	5	5	10	9.5	98%
Windstream Nebraska, Inc.	Bruning	177	177	212	210	99%	31	66	-35	6	6	3	3.2	99%
Windstream Nebraska, Inc.	Bruno	202	202	196	198	101%	65	64	0	3	3	3	3.1	101%
Windstream Nebraska, Inc.	Burchard	232	232	133	140	105%	143	66	78	2	2	2	2.1	105%
Windstream Nebraska, Inc.	Burr	73	77	93	86	92%	30	40	-11	2	3	2	2.1	92%
Windstream Nebraska, Inc.	Carleton	79	79	79	80	102%	36	37	-1	2	2	2	2.2	102%
Windstream Nebraska, Inc.	Cedar_Bluffs	439	439	450	445	99%	54	60	-6	8	8	8	7.4	99%
Windstream Nebraska, Inc.	Ceresco	493	491	516	521	101%	38	46	-9	13	13	11	11.2	101%
Windstream Nebraska, Inc.	Clatonia	189	185	188	184	98%	34	32	1	6	6	6	5.7	98%
Windstream Nebraska, Inc.	Clay_Center	389	389	409	408	100%	48	95	-47	8	8	4	4.3	100%
Windstream Nebraska, Inc.	Colon	138	132	144	135	94%	31	30	2	4	4	5	4.6	94%

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		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Windstream Nebraska, Inc.	Cook	294	295	276	280	102%	79	71	8	4	4	4	4.0	102%
Windstream Nebraska, Inc.	Cordova	127	125	111	109	98%	38	31	7	3	3	4	3.5	98%
Windstream Nebraska, Inc.	Cortland	459	434	441	432	98%	56	57	-1	8	8	8	7.6	98%
Windstream Nebraska, Inc.	Crab_Orchard	136	136	86	80	93%	80	53	26	2	2	2	1.5	93%
Windstream Nebraska, Inc.	Crete	2,852	2,834	2,846	2,830	99%	154	143	11	19	18	20	19.8	99%
Windstream Nebraska, Inc.	Davenport	237	237	224	225	100%	87	76	12	3	3	3	3.0	100%
Windstream Nebraska, Inc.	Davey	434	426	387	402	104%	65	61	3	7	7	6	6.6	104%
Windstream Nebraska, Inc.	David_City	1,458	1,458	1,447	1,438	99%	134	125	9	11	11	12	11.5	99%
Windstream Nebraska, Inc.	Dawson	210	210	163	162	99%	105	59	46	2	2	3	2.8	99%
Windstream Nebraska, Inc.	Daykin	162	163	165	161	97%	68	68	0	2	2	2	2.4	97%
Windstream Nebraska, Inc.	Denton	503	519	526	579	110%	48	49	-2	11	11	11	11.7	110%
Windstream Nebraska, Inc.	Deweese	223	223	120	120	100%	133	58	74	2	2	2	2.1	100%
Windstream Nebraska, Inc.	Dewitt	366	367	365	373	102%	68	68	0	5	5	5	5.5	102%
Windstream Nebraska, Inc.	Dorchester	358	363	395	393	100%	65	80	-15	6	6	5	4.9	100%
Windstream Nebraska, Inc.	Douglas	191	193	180	177	98%	43	38	5	4	5	5	4.7	98%
Windstream Nebraska, Inc.	Dubois	126	126	119	124	104%	45	44	1	3	3	3	2.8	104%
Windstream Nebraska, Inc.	Dunbar	262	257	261	260	100%	80	79	1	3	3	3	3.3	100%
Windstream Nebraska, Inc.	Dwight	167	164	177	167	94%	37	42	-6	5	4	4	4.0	94%
Windstream Nebraska, Inc.	Eagle	982	989	999	975	98%	69	63	6	14	14	16	15.6	98%
Windstream Nebraska, Inc.	Edgar	254	254	272	270	99%	63	80	-17	4	4	3	3.4	99%
Windstream Nebraska, Inc.	Elk_Creek	309	309	108	104	96%	141	37	103	2	2	3	2.8	96%
Windstream Nebraska, Inc.	Elmwood	418	417	445	432	97%	44	51	-7	9	9	9	8.5	97%
Windstream Nebraska, Inc.	Exeter	364	364	327	323	99%	106	74	33	3	3	4	4.4	99%
Windstream Nebraska, Inc.	Fairbury	2,310	2,308	2,274	2,277	100%	232	212	20	10	10	11	10.8	100%
Windstream Nebraska, Inc.	Fairfield	193	193	239	240	100%	26	64	-38	7	7	4	3.7	100%
Windstream Nebraska, Inc.	Fairmont	286	286	308	307	100%	41	62	-21	7	7	5	5.0	100%
Windstream Nebraska, Inc.	Filley	166	165	162	168	104%	47	51	-4	4	3	3	3.3	104%
Windstream Nebraska, Inc.	Firth	580	578	583	580	99%	48	48	-1	12	12	12	12.0	99%
Windstream Nebraska, Inc.	Friend	582	580	576	579	101%	114	118	-4	5	5	5	4.9	101%
Windstream Nebraska, Inc.	Garland	309	307	272	286	105%	45	40	5	7	7	7	7.2	105%
Windstream Nebraska, Inc.	Geneva	1,147	1,147	1,119	1,124	100%	170	144	27	7	7	8	7.8	100%
Windstream Nebraska, Inc.	Glenvil	291	290	300	293	98%	125	76	50	2	2	4	3.9	98%
Windstream Nebraska, Inc.	Grafton	99	100	97	98	101%	43	42	0	2	2	2	2.3	101%
Windstream Nebraska, Inc.	Greenwood	309	304	308	315	102%	20	25	-5	15	15	12	12.6	102%
Windstream Nebraska, Inc.	Gresham	166	168	209	210	101%	37	70	-33	4	5	3	3.0	101%
Windstream Nebraska, Inc.	Guide_Rock	179	176	210	212	101%	64	113	-49	3	3	2	1.9	101%
Windstream Nebraska, Inc.	Hallam	188	189	198	198	100%	36	39	-3	5	5	5	5.0	100%
Windstream Nebraska, Inc.	Hansen	251	285	267	284	106%	91	98	-6	3	3	3	2.9	106%
Windstream Nebraska, Inc.	Hardy	137	137	103	104	101%	66	39	27	2	2	3	2.6	101%
Windstream Nebraska, Inc.	Harvard	500	502	482	480	100%	104	95	9	5	5	5	5.1	100%
Windstream Nebraska, Inc.	Hastings	10,767	10,738	10,570	10,583	100%	154	151	2	70	70	70	69.9	100%
Windstream Nebraska, Inc.	Hebron	926	926	942	942	100%	153	160	-7	6	6	6	5.9	100%
Windstream Nebraska, Inc.	Hickman	1,076	1,094	1,136	1,131	100%	41	47	-6	26	27	24	24.2	100%
Windstream Nebraska, Inc.	Humboldt	538	538	609	607	100%	81	138	-57	7	7	4	4.4	100%
Windstream Nebraska, Inc.	Ithaca	138	140	137	135	99%	23	22	1	6	6	6	6.3	99%
Windstream Nebraska, Inc.	Jansen	121	123	137	134	98%	38	42	-4	3	3	3	3.2	98%

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		Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff	sq mi	sq mi	delta	Method 1[a]	Method 2[b]	Method 1[a]	Method 2[b]	Pct Diff
Windstream Nebraska, Inc.	Johnson	309	309	307	301	98%	62	64	-2	5	5	5	4.7	98%
Windstream Nebraska, Inc.	Julian	59	59	57	71	124%	15	18	-3	4	4	3	3.9	124%
Windstream Nebraska, Inc.	Juniata	522	555	681	682	100%	47	52	-5	11	12	13	13.0	100%
Windstream Nebraska, Inc.	Kenesaw	425	423	417	421	101%	71	70	1	6	6	6	6.0	101%
Windstream Nebraska, Inc.	Liberty	153	153	107	108	101%	109	75	33	1	1	1	1.4	101%
Windstream Nebraska, Inc.	Lincolniv	0	0	9,645	9,846	102%	0	30	-	0	0	319	325.6	102%
Windstream Nebraska, Inc.	Lincolnvi	0	0	20,985	20,642	98%	0	21	-	0	0	1,024	1,006.9	98%
Windstream Nebraska, Inc.	Lincolnvii	18,040	18,086	664	727	109%	50	40	10	359	360	17	18.2	109%
Windstream Nebraska, Inc.	Lincolnx	0	0	16,363	16,396	100%	0	10	-	0	0	1,564	1,567.3	100%
Windstream Nebraska, Inc.	Lincolnxx	0	0	29,759	29,908	101%	0	17	-	0	0	1,766	1,774.5	101%
Windstream Nebraska, Inc.	Lincolnxxx	46,859	46,785	23,997	23,991	100%	56	94	-39	843	842	254	254.2	100%
Windstream Nebraska, Inc.	Lincolnxxxx	0	0	5,079	4,957	98%	0	47	-	0	0	109	106.1	98%
Windstream Nebraska, Inc.	Louisville	1,061	1,038	1,095	1,080	99%	46	46	-1	23	23	24	23.3	99%
Windstream Nebraska, Inc.	Malcolm	543	528	515	513	100%	39	38	1	14	13	13	13.3	100%
Windstream Nebraska, Inc.	Martell	421	415	442	401	91%	45	42	4	9	9	11	9.6	91%
Windstream Nebraska, Inc.	Mccool_Junction	345	348	347	347	100%	78	82	-4	4	4	4	4.2	100%
Windstream Nebraska, Inc.	Mead	357	353	367	361	98%	38	55	-16	9	9	7	6.6	98%
Windstream Nebraska, Inc.	Milford	1,229	1,223	1,215	1,203	99%	101	94	7	12	12	13	12.8	99%
Windstream Nebraska, Inc.	Milligan	229	229	214	218	102%	83	68	15	3	3	3	3.2	102%
Windstream Nebraska, Inc.	Murdock	271	274	271	277	102%	47	44	2	6	6	6	6.3	102%
Windstream Nebraska, Inc.	Murray	1,166	1,163	1,054	1,024	97%	44	42	3	26	26	25	24.6	97%
Windstream Nebraska, Inc.	Nebraska_City	3,458	3,464	3,458	3,448	100%	140	134	5	25	25	26	25.7	100%
Windstream Nebraska, Inc.	Nehawka	163	164	175	181	103%	34	42	-8	5	5	4	4.3	103%
Windstream Nebraska, Inc.	Nelson	422	422	417	418	100%	151	172	-21	3	3	2	2.4	100%
Windstream Nebraska, Inc.	Nemaha	149	148	101	104	103%	65	29	36	2	2	4	3.6	103%
Windstream Nebraska, Inc.	Octavia	123	121	108	116	108%	34	33	2	4	4	3	3.6	108%
Windstream Nebraska, Inc.	Ohiowa	104	104	125	124	99%	45	62	-17	2	2	2	2.0	99%
Windstream Nebraska, Inc.	Ong	63	63	53	57	108%	37	31	6	2	2	2	1.8	108%
Windstream Nebraska, Inc.	Osceola	433	433	556	551	99%	29	103	-74	15	15	5	5.4	99%
Windstream Nebraska, Inc.	Otoe	111	112	121	112	92%	18	21	-2	6	6	6	5.3	92%
Windstream Nebraska, Inc.	Palmyra	537	516	492	502	102%	66	64	1	8	8	8	7.8	102%
Windstream Nebraska, Inc.	Panama	229	231	226	246	109%	31	33	-2	7	7	7	7.4	109%
Windstream Nebraska, Inc.	Pawnee_City	490	490	577	567	98%	55	103	-48	9	9	6	5.5	98%
Windstream Nebraska, Inc.	Peru	295	295	300	301	100%	39	43	-4	8	8	7	7.1	100%
Windstream Nebraska, Inc.	Pickrell	269	275	266	274	103%	66	65	1	4	4	4	4.2	103%
Windstream Nebraska, Inc.	Plattsmouth	3,914	3,921	4,043	4,082	101%	100	104	-4	39	39	39	39.1	101%
Windstream Nebraska, Inc.	Pleasant_Dale	313	334	259	283	109%	42	32	10	7	8	8	8.9	109%
Windstream Nebraska, Inc.	Plymouth	320	324	319	323	101%	70	74	-4	5	5	4	4.3	101%
Windstream Nebraska, Inc.	Polk	370	371	315	306	97%	118	87	31	3	3	4	3.5	97%
Windstream Nebraska, Inc.	Raymond	471	481	464	477	103%	54	52	1	9	9	9	9.1	103%
Windstream Nebraska, Inc.	Rising_City	287	288	288	287	100%	68	73	-5	4	4	4	3.9	100%
Windstream Nebraska, Inc.	Ruskin	104	104	108	101	94%	48	43	5	2	2	3	2.3	94%
Windstream Nebraska, Inc.	Seward	3,015	3,019	3,119	3,100	99%	107	121	-15	28	28	26	25.6	99%
Windstream Nebraska, Inc.	Shelby	427	427	487	478	98%	84	88	-3	5	5	6	5.5	98%
Windstream Nebraska, Inc.	Shickley	255	255	249	245	99%	99	85	14	3	3	3	2.9	99%
Windstream Nebraska, Inc.	Steele_City	61	62	68	67	99%	27	29	-2	2	2	2	2.3	99%

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Windstream Nebraska, Inc.	Steinauer	84	84	105	102	97%	36	58	-22	2	2	2	1.7	97%
Windstream Nebraska, Inc.	Sterling	315	314	426	428	100%	42	94	-52	7	7	5	4.5	100%
Windstream Nebraska, Inc.	Stromsburg	580	580	640	653	102%	60	97	-37	10	10	7	6.7	102%
Windstream Nebraska, Inc.	Superior	1,086	1,086	1,095	1,094	100%	143	115	29	8	8	10	9.5	100%
Windstream Nebraska, Inc.	Surprise	80	78	77	75	98%	49	43	7	2	2	2	1.8	98%
Windstream Nebraska, Inc.	Sutton	813	810	860	864	100%	137	177	-40	6	6	5	4.9	100%
Windstream Nebraska, Inc.	Swanton	82	81	84	83	99%	31	32	0	3	3	3	2.6	99%
Windstream Nebraska, Inc.	Syracuse	1,148	1,145	1,124	1,121	100%	103	91	12	11	11	12	12.3	100%
Windstream Nebraska, Inc.	Table_Rock	217	217	208	208	100%	61	52	9	4	4	4	4.0	100%
Windstream Nebraska, Inc.	Talmage	153	155	184	184	100%	30	49	-18	5	5	4	3.8	100%
Windstream Nebraska, Inc.	Tamora	149	150	162	162	100%	33	39	-6	4	5	4	4.1	100%
Windstream Nebraska, Inc.	Tecumseh	995	995	1,031	1,039	101%	134	154	-20	7	7	7	6.7	101%
Windstream Nebraska, Inc.	Tobias	113	113	120	116	97%	42	50	-8	3	3	2	2.3	97%
Windstream Nebraska, Inc.	Unadilla	250	253	244	253	104%	52	52	1	5	5	5	4.9	104%
Windstream Nebraska, Inc.	Union	266	264	274	276	101%	34	42	-8	8	8	7	6.6	101%
Windstream Nebraska, Inc.	Utica	471	471	482	478	99%	73	74	-1	6	6	7	6.5	99%
Windstream Nebraska, Inc.	Valparaiso	589	585	587	580	99%	97	92	4	6	6	6	6.3	99%
Windstream Nebraska, Inc.	Waco	232	233	257	260	101%	61	75	-14	4	4	3	3.5	101%
Windstream Nebraska, Inc.	Wahoo	2,181	2,187	2,163	2,182	101%	90	89	0	24	24	24	24.5	101%
Windstream Nebraska, Inc.	Waverly	1,404	1,414	1,422	1,399	98%	66	61	5	21	21	23	22.8	98%
Windstream Nebraska, Inc.	Weeping_Water	722	720	644	657	102%	69	66	3	10	10	10	9.9	102%
Windstream Nebraska, Inc.	Western	197	195	197	201	102%	64	63	1	3	3	3	3.2	102%
Windstream Nebraska, Inc.	Wilber	905	906	919	923	100%	97	109	-12	9	9	8	8.4	100%
Windstream Nebraska, Inc.	Wymore	930	936	941	939	100%	82	83	-1	11	11	11	11.4	100%
Windstream Nebraska, Inc.	York	3,744	3,741	3,721	3,726	100%	159	148	11	24	24	25	25.2	100%
Windstream Nebraska, Inc.	Yutan	736	734	727	723	99%	47	43	4	16	16	17	16.8	99%